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Lena Dzifa Mensah

Development of Food Safety Capability in Ghana to Enhance Access to the Global Food Manufacturing Value Chain (GFMVC)

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Lena Dzifa Mensah

Development of Food Safety Capability in Ghana to Enhance Access to the Global Food Manufacturing Value Chain (GFMVC)

Supervisor: Denyse Julien

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ABSTRACT

Demonstrating compliance with food safety requirements of the global economy is a pre-requisite for access. As tariff barriers diminish, developing countries are exposed to greater opportunities for repositioning their food manufacturing sectors in global value chains (GVCs). At the same time, the measures for the protection of public health and safety are becoming more stringent because of the series of food safety crises that characterised the global food value chain in the 1980s and 1990s, and that still linger on. The new demands arising from the need to protect consumer safety, coupled with the structure of the global economy have introduced new challenges for developing countries in terms of accessing the global food manufacturing value chain(GFMVC) with manufactured products. This is the case for the Ghanaian food manufacturing sector. Therefore, this study aims to understand the practice of developing food safety capability to enhance access to the GFMVC using high value added products, to identify performance gaps in the Ghanaian context and propose an appropriate framework (legal, institutional and policy) to address the major gaps, while meeting the basic requirements of food safety.

A multiple case study methodology was adopted, using the UK food and drinks sector as a benchmark for the Ghanaian food manufacturing sector. The main techniques employed for data collection were surveys, interviews and content analysis.

Based on the findings and insights gathered from the investigation, a technical regulation based on Hazard Analysis and Critical Control Point (HACCP) is proposed as a means to enhance the compliance of enterprises in Ghana with the basic requirements of food safety. Because of the current lack of capability at the national and enterprise level, a four-phase implementation plan is recommended to progressively ease enterprises into mandatory compliance with integrated food safety management systems. The study also recommends that the current multiple agency structure is maintained, however, mandates, roles and responsibilities, and jurisdictions need to be clarified, and values reformed. Various kinds of support (e.g. funds, training) also have to be provided to enterprises to facilitate their compliance and enhance their access to the GFMVC.

Keywords:

Food manufacturing, food safety, international trade, regulation, Ghana

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PUBLICATIONS AND PRESENTATIONS

Journals

Mensah, L. D., and Julien, D., (2011), "Enhancing access to the global food manufacturing value chain: the role of a food safety technical regulation in Ghana", *Journal of International Food & Agribusiness Marketing,* vol. 23, pp. 247-270.

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Conferences

Mensah, L. D., Greenough, R., and Julien, D., (2008), Moving up the value chain of cocoa: the role of fair trade, *Proceedings of the International Conference on Manufacturing Research (ICMR),* 09-11 September 2008, Brunel University, Uxbridge, UK.

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Mensah, L. D., and Julien, D., (2009), "Towards a roadmap for an integrated food safety management in Ghana", *Manufacturing Research Day poster presentation,* 12th October, 2009, Cranfield University, Milton Keynes, UK.

Mensah, L. D., and Julien, D., (2010), "A roadmap for an integrated food safety management in Ghana ", EPSRC Research Methodology Workshop 25-26th 12thMarch, 2010, Institute of Manufacturing, Cambridge, UK

Mensah, L. D., and Julien, D., (2010), "A roadmap for an integrated food safety management in Ghana ", Faculty for the Future Forum, 14-16th July, 2010, Schlumberger Cambridge Research Centre, Cambridge, UK

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GLOSSARY

AFRCD	Armed Forces Revolutionary Council Decree
AHP	Analytical Hierarchical Process
APA	Association of Public Analysts
ASAN	Association of Southeast Asian Nations
B2B	Business to Business
BBC	British Broadcasting Corporation
BRC	British Retail Consortium
BRTF	Better Regulation Task Force
BSE	Bovine Spongiform Encephalopathy
CAC	Codex Alimentarius Commission
CCP	Critical Control Point
CEPS	Customs Excise and Preventive Service
CIA	Central Intelligence Agency
CMC	Cocoa Marketing Company
CoA	Certificate of Analysis
DEFRA	Department of Environment Food and Rural Affairs
DIC	Documentation and Information Centre
DoH	Department of Health
EC	European Commission
EFA	Exploratory Factor Analysis
EOI	Export Oriented Industrialisation
EU	European Union
FAGE	Federation of Association of Ghanaian Exporters
FAO	Food and Agricultural Organisation
FDB	Food and Drugs Board
FDF	Food and Drinks Federation
FSA	Food Standards Agency
FSMS	Food Safety Management System
GCC	Global Commodity Chain
GVC	Global Value Chain
GFMVC	Global Food Manufacturing Value Chain
GDP	Gross Domestic Product
GFSI	Global Food Safety Initiative
GHP	Good Hygiene Practices
GMP	Good Manufacturing Practices
GNI	Gross National Income
GoG	Government of Ghana

GSB	Ghana Standards Board
HACCP	Hazard Analysis and Critical Control Point
IEHO	Institute of Environmental Health Officers
IFS	International Food Standard
ISI	Import Substitution Industrialisation
ISO	International Standards Organisation
ITC	International Trade Centre
LACORS	Local Authority Coordinators of Regulatory Services
LAEMS	Local Authority Enforcement Monitoring System
LGA	Local Government Association
LI	Legislative Instrument
MAFF	Ministry of Agriculture Food and Fisheries
ML	Maximum Likelihood
MRP	Material Requirements Planning
NDPC	National Development Planning Committee
NFG	National Focus Groups
NGO	Non Governmental Organisation
NRCD	National Redemption Council Decree
NLCD	National Liberation Council Decree
PNDCL	Provisional National Defence Council Law
PPP	Purchasing Power Parity
QA	Quality Assurance
RIA	Regulatory Impact Assessment
SALSA	Safe and Local Supplier Approval
SAQ	Supplier Assessment Questionnaire
SDoC	Supplier Declaration of Conformity
SEDEX	Supplier Ethical Data Exchange
SME	Small and Medium Enterprises
SPS	Sanitary and Phytosanitary
SQF	Safe Quality Food
SSC	Sector Skills Council
TBT	Technical Barriers to Trade
TC	Technical Committee
TD	Technical Director
UKAS	United Kingdom Accreditation Service
UKCES	United Kingdom Commission for Employment and Skills
UNIDO	United Kingdom Industrial Development Organisation
WET	World Economic Triangle
WHO	World Health Organisation
WTO	World Trade Organisation

CHAPTER 1: INTRODUCTION

This thesis reports on the work done to investigate the means of enhancing access to the global food manufacturing value chain (GFMVC). While drawing on lessons from the UK food and drinks sector, the study explores the food safety assurance system in the Ghanaian food manufacturing sector to identify opportunities for enhancing the compliance of enterprises with the basic food safety requirements of the GFMVC.

This chapter discusses the context and significance of the study, and outlines the aim and objectives of the research. An overview of the economies of the two cases of interest, Ghana and the UK, are given, and the overall thesis structure is also presented.

1.1 Context of the Research

Before the late 1980s, most developing countries in Africa (e.g. Ghana, Nigeria, and Cote D'Ivoire) employed Import Substitution Industrialisation (ISI) strategy and participated in global value chains (GVCs) mostly through trading of raw commodities. ISI is a development theory which advocates the intervention of governments in industrial development through investments in public enterprises and protection of selected industries or sectors that are underdeveloped, to allow the sectors time to acquire capabilities to compete before liberalising. The World Bank and IMF advocate an Export-Oriented Industrialization (EOI) strategy (UNCTAD, 2008) which allows both commodities and people to move freely between countries. Developing countries adopted this strategy in the hope of taking advantage of technological knowledge from developed countries and increasing their prospect of participating in GVCs with high value-added products, *inter alia*. Approximately three decades after adopting EOI strategies, the popular model employed to participate in the global economy continues to be mainly through raw commodities.

With diminishing tariff barriers to international trade (WTO, 2008), attention has been drawn to the potential use of non-tariff measures (e.g. food safety regulations) as trade barriers. The World Trade Organisation's (WTO) agreements relevant to the food

industry endorse non-tariff barriers, particularly when these are used as measures to protect the health and safety of consumers, and encourage the use of international standards where applicable as measures for the protection of public health and safety. However, a scientific risk-based and economic justification is required if more stringent measures than international standards are adopted (Henson & Caswell, 1999).

After a series of crises arising from contaminated food in America, Europe (Loader and Hobbs, 1999), and some Asian countries, it became apparent that existing measures for the protection of consumer health and safety were inappropriate and ineffective. Public outcry for improved measures, hence, led to the application of more stringent measures.

The removal of trade barriers has exposed developing countries to greater opportunities for economic growth and increased competitive pressure for the survival of their manufacturing enterprises (Subramanian, 2007). However, the new demands arising from the need to protect consumer health and safety and increase consumer confidence, coupled with the structure of the global economy and the governance executed within GVCs have introduced new challenges for developing countries. This has spurred growing debate on whether developing countries can industrialise and use their manufactured products to participate in GVCs (Cramer, 1999). Empirical as well as theoretical literature on the question of commodity manufacturing in developing countries is divided: one perspective suggests that because of the power of lead enterprises exhibited in GVCs, the significant quality and safety demands placed on developing countries, and the challenges faced in their quest to comply with these requirements, coupled with limited demand (Cramer, 1999; Diao & Dorosh, 2007), a move to higher value-added manufacturing may not raise incomes on the scale required to affect overall economic growth (Love, 1983; Diao & Dorosh, 2007).

The less pessimistic perspective recognises the constraints put forward by the opposing perspective; however, argues that the significant challenges or constraints faced by developing countries in their pursuit of diversifying into manufactured food products are as a result of the internal structure of their economies (Cramer, 1999), the institutional, legislative and policy frameworks (Henson & Jaffee, 2008). Available

empirical evidence (Humphrey & Schmitz, 2002; Diao & Dorosh, 2007; Henson & Jaffee, 2008), shows that some countries have successfully upgraded and are participating in GVCs, despite these challenges.

In the context of food, this debate will not be complete without recognising the influential role the concept of food safety plays in who gets access to the global food manufacturing value chain (GFMVC). The debate on commodity manufacturing and analysis has often focussed on the potential economic gains that accrue to countries without due consideration of the health and safety of consumers, which has become the primary concern for both the public and private sector (Canavari et al, 2010), and hence features prominently in decision-making concerning who gets access to GVCs. Food safety has become the basic requirement (order qualifier) for accessing the GFMVC, even before other competitive dimensions, also known as order winners (e.g. quality, price, and response time) are considered. It is believed that consumers globally have a right to safe food (Universal Declaration of Human Rights, 1948), and under no circumstances (poor or affluent, in domestic, regional or global markets) should they be deprived of this basic right. This puts food safety considerations at the core of the debate on commodity manufacturing relevant to the food industry and competitive repositioning within the GFMVC.

1.2 Significance of the Study

The globalization of food value chains present risks that have significant impacts on costs arising from health care provision, public health and safety, *inter alia*. The potential damage of food safety system failures is demonstrated in the outbreak of *Bovine Spongiform Encephalopathy* (BSE) in the UK in 1986, and the recent outbreak of *E. coli* in the Northern part of Germany, between May and June, 2011, which claimed 35 lives and infected over 3255 consumers with food borne diseases (BBC, 2011). The latter outbreak also resulted in Russia placing a blanket temporary ban on vegetables from the European Union because the source of the outbreak could not be easily and quickly identified. Several million pounds worth of food products were also destroyed in Spain because a wrong source of the hazard was named.

To ensure that the impact of food safety system failures are minimised and systems are in place to quickly and adequately respond to food safety system failures, changes in the governance of food are occurring that are impacting differently on different actors:

- Global institutions are calling for more stringent mechanisms for the protection of public health and safety;
- Consumers are increasingly demanding safer food, with increasing disposable income;
- National governments have responded to both global and consumer demands and are implementing more stringent requirements;
- The private sector has responded both to global demands and the requirements of national governments and consumers, by changing the governance and mechanisms for integrating prospective actors into the GFMVC;
- Prospective actors from developing countries are finding it burdensome to comply with new requirements, and hence are excluded from accessing and participating in the GFMVC.

Given that countries are not relenting in their efforts to protect public health and safety, and that accessing and participating in the GFMVC have implications for economic growth and development for developing countries, there is the need to clearly understand the governance and controls executed in the GFMVC, its implications for the scope of action open to manufacturing enterprises in developing countries, and what upgrading alternatives will facilitate compliance of enterprises with the basic requirements for accessing the GFMVC.

1.3 Overview of the Ghanaian Economy

The structure of Ghana's economy, like all other economies, is developed around three main sectors: agriculture, industry and services. The economy predominantly depends

on the agricultural sector, which contributes an average of approximately 44.5[1]% to Gross Domestic Product (GDP) annually (Figure 1-1).

The services sector contributes an average of approximately 33.7% annually to GDP and the industrial sector, which includes manufacturing, is the smallest contributor to GDP, contributing an average of approximately 21.8% annually.

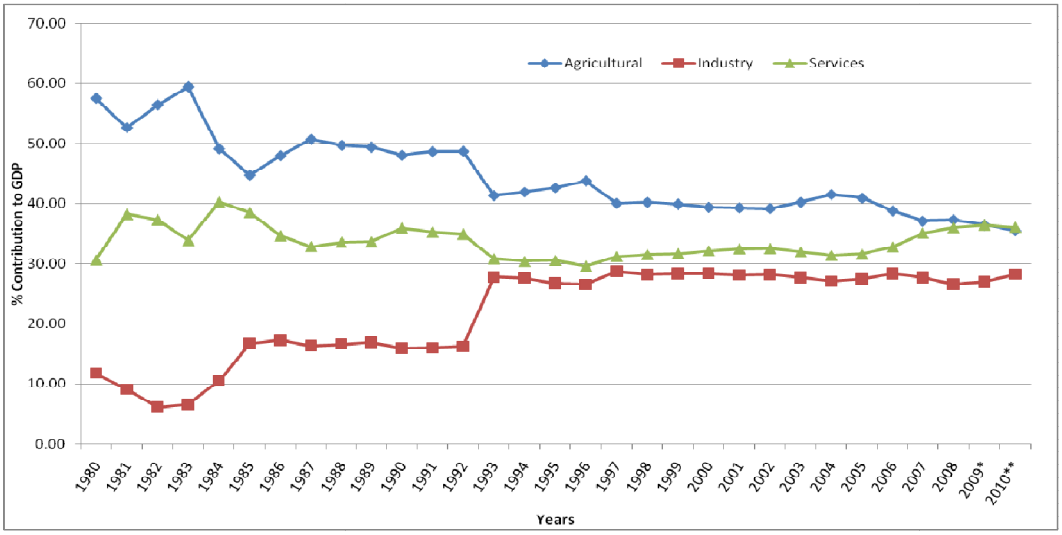
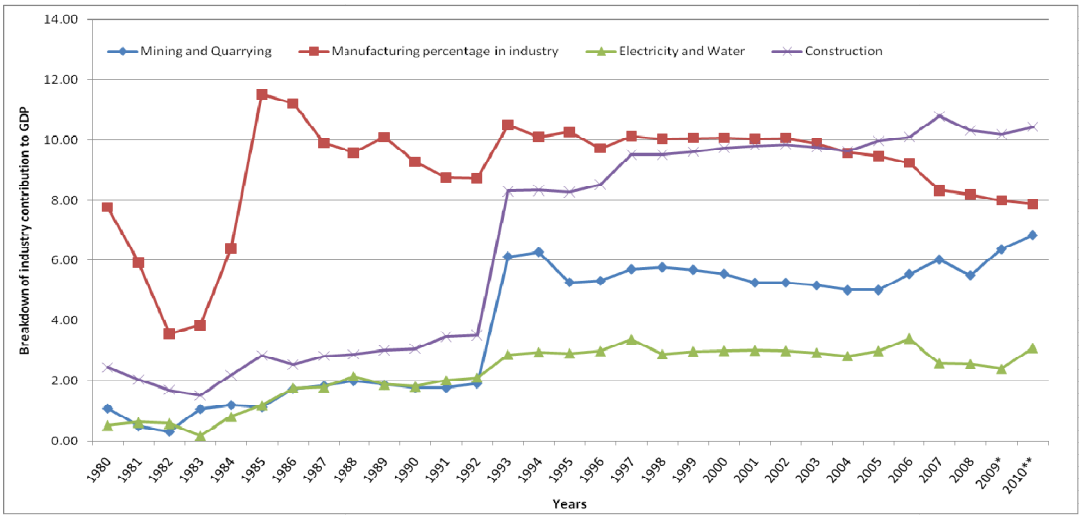


Figure 1-1: Sector contribution to GDP

(Source: Ghana Statistical Service)



* & ** are estimates

Figure 1-2: Breakdown of industry contribution to GDP

(Source: Ghana Statistical Service)

[1] Average calculated using data from the period 1980 to 2010

Of this percentage, manufacturing contributes an average of approximately 9.0% annually (Figure 1-2), and the share of manufactured food exports in that percentage is 3.4%.

The CIA (2011) estimates Ghana's population at approximately 24, 000 000. A significant amount of the population belongs to the age demographics 15-64 (Figure 1-3). The labour force is 10.56 million (2010 est.), approximately 43% of the overall population. The agricultural sector is served by 56% of the overall labour force; 29% serve the services sector and 15% serve the industrial sector. Out of the total labour force serving the industrial sector, 33% are involved in manufacturing (i.e. approximately 5% of the total labour force contribute 9% to GDP annually).

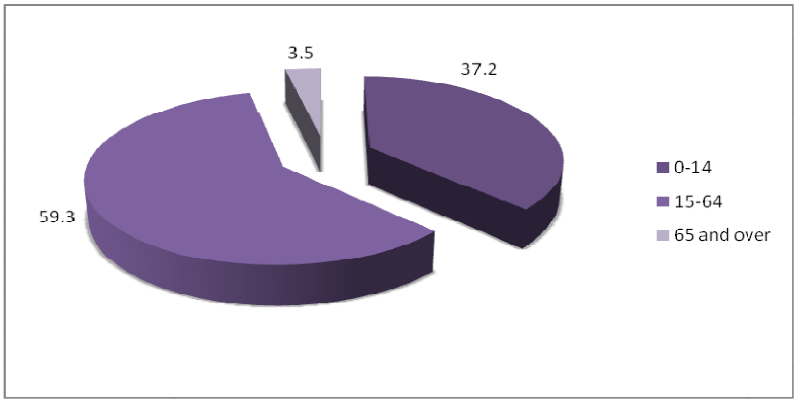


Figure 1-3: Age demographics of Ghana

(Source: CIA, 2011)

For operational and analytical purposes, the World Bank (WB) classifies economies in Gross National Income [2](GNI) Purchasing Power Parity (PPP)[3]. Based on the different bands of GNI per capita, every country is classified as low income (US$995 or less), middle income, (which is subdivided into two: lower middle income and upper middle income), US ($996-$3945; $3946-12195), and high income (US$12196 or more). According to the World Bank, Ghana's GNI is US$1530 (2009 est.), which puts the

[2] GNI, current dollars, measures the total income of all people who are citizens of a particular country.

[3] Using PPP basis is arguably more useful when comparing generalised differences in living standards on the whole between nations because PPP takes into account the relative cost of living and the inflation rates of the countries, rather than using just exchange rates which may distort the real differences in income.

country in the band of lower middle income countries. Approximately 28.5% (2007 est.) of the population are under the poverty level.

Ghana has gone through a series of reforms in its economy in an attempt to ensure that the livelihoods of its citizens improve to the level of a middle income country, and this improvement is sustained over a long period of time.

Several years after liberalising the domestic market and adopting some export-oriented policies, the economy of Ghana continues to depend on raw commodities both for economic growth and for accessing international markets. The old economic structure, which heavily depended on the country's natural resource endowment, primarily comprising gold, cocoa and timber, is still the model in use.

Comparing the economic status of Ghana to other similar African countries, it is realised that in a sense, Ghana has been left behind in the national development stakes (NDPC, 2005). Countries like Botswana, Kenya, Tunisia and Namibia, all of which had similar, sometimes even lower, levels of per capita income than Ghana in the past five decades, now have significantly higher levels of per capita income. It is against this background that Ghana is motivated to share in the standards of living being experienced in the global economy (NDPC, 2005). The goal of the government of Ghana (GOC) is, hence, to facilitate the attainment of this standard through a variety of policy initiatives, with middle income status as the main target.

Through the National Development Planning Commission (NDPC) the government developed a series of strategies to transform the economy into middle income status by the year 2015. The first strategy, known as the Ghana Poverty Reduction Strategy (GPRS I), (2003-2005) had its policies focussing primarily on maintaining macro-economic stability. At the end of its implementation the strategy was criticised for not providing a clear policy direction which recognises a stable macro-economic environment as a platform upon which to develop economically.

The second strategy introduced was called the Growth and Poverty Reduction Strategy (GPRS II) (2006–2009). The GPRS II drew on lessons and experiences from the implementation of the GPRS I (2003-2005), to complement the newly acquired goals and visions of becoming a middle income country by the year 2015. A target economic

growth rate of 6-8% was to be realised annually if the set target is to be reached within the set time frame.

With a relatively stable macroeconomic environment in place, courtesy the GPRS I, the focus of the GPRS II was to accelerate economic growth through measures that increase private sector competitiveness (e.g. improving access to global and regional markets, and promoting trade and industry) and diversifying Ghana's export base to include agro-processing, among other initiatives. Because the core of the medium to long term goal of industrialisation in Ghana was hinged on agriculture, measures were to be implemented that would ensure that agricultural productivity increases, to set the scene for agro-industrialisation.

At the end of the implementation of GPRS II, available statistics (see e.g. ISSER, 2009) indicate that the average real GDP growth rate is 6.05 (see Figure 1-4 for trends in GDP growth rate). Apparently, some progress is being made towards reaching middle income status, even though GDP growth rate is at the lower end of the set target.

Analysis of the overall structure of the economy of Ghana reveals no significant changes; there is still a significant dependence on raw agricultural commodities for export and economic growth.

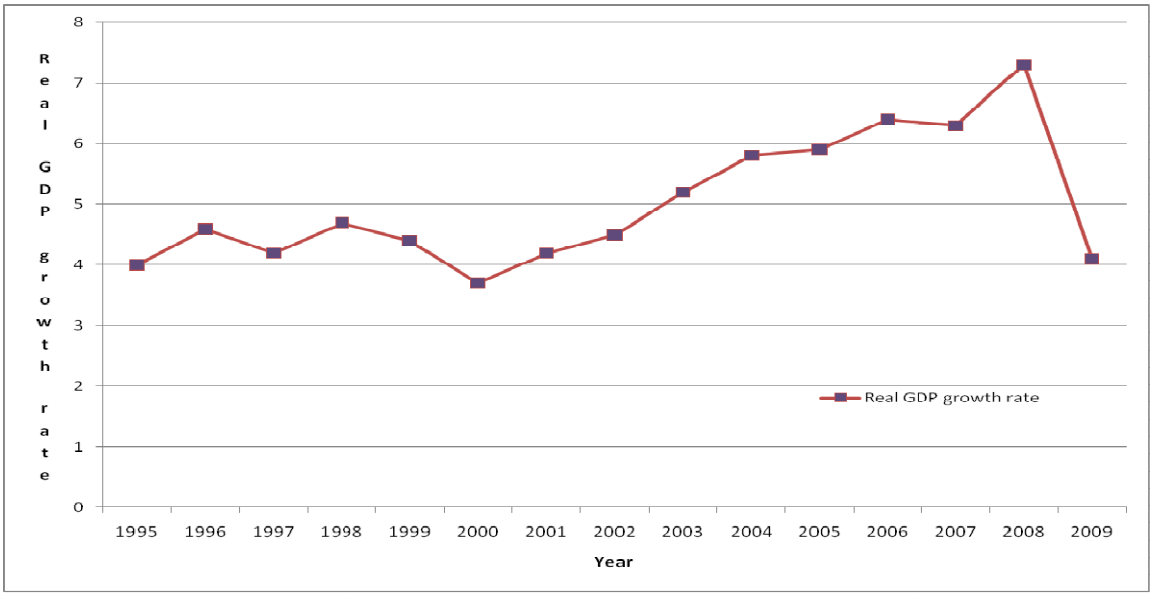


Figure 1-4: Real GDP growth rates

(Source: NDPC, 2005/ISSER, 2009)

In spite of the agricultural sector being the primary focus of development policy and structural reforms under the GPRS II, the sector's contribution to GDP progressively fell (ISSER, 2009) (also see Figure 1-1). The agricultural sector has not provided the structural transformation needed, however, little is being done in terms of allocating significant resources into other sectors. This brings into question whether focussing significantly on the agricultural sector will facilitate achieving the targets of economic growth anticipated. Some proponents (e.g. NPDC, 2005) of agricultural-led policies argue that the highest proportion of the overall labour force (56%) is employed by the sector, and that qualifies it as the target for structural reforms and economic growth. Consequently, growth in the sector will impact on overall growth in the economy, employment, food security and contribute immensely towards the health and well being of Ghanaians. Furthermore, since the comparative advantage of Ghana is mainly in agriculture, it will be easier to convert this comparative advantage into competitive advantage. The National Development Planning Commission argued that by focussing on modernising agriculture in the short term, the scene could be set in the medium to long term for transformation that will affect both industry and services.

Critics of agricultural-led strategies, however, argue that for various reasons, among them, changing climatic conditions, fluctuations in raw commodity prices (FAO, 2009), and low demand for agricultural commodities from the international market (Diao & Dorosh, 2007), continuing to depend on the raw commodities (cocoa, gold and timber)[4] cannot provide sustained economic growth for Ghana. It is generally believed in Ghana that increased and sustained economic growth lies in diversifying away from the three primary commodities upon which the economy currently depends, adding some elements of processing, manufacturing and technology development (NDPC, 2005) and increasing exports of high value-added products.

While trends in Ghana may not be encouraging, in terms of structural shifts and policy orientation towards manufacturing, the private sector seems to be shifting towards light manufacturing. Available export data (ISSER, 2009) shows that the manufacturing share of total exports has risen significantly over time: from about 1% in the 1960s to

[4] These three commodities are known as traditional commodities.

15% in the late 1990s, and the food manufacturing sector has and is still playing a significant role in the growth of the manufacturing sector.

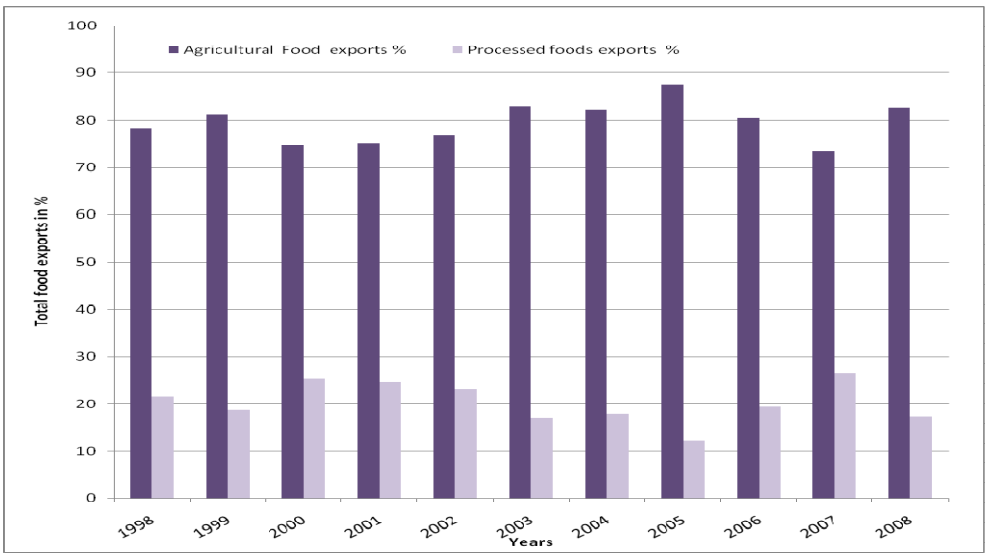


Figure 1-5: Comparison of exports of manufactured food and raw food

Analysing export performance of Ghana's non-traditional products[5] reveals that processed and manufactured food accounts for an average of approximately 20% (Figure 1-5) of Ghana's food exports. Approximately 5% of the total labour force is involved in manufacturing and yet the sector contributes 9% to annual GDP.

Given that the food manufacturing sector is relatively young, and considering the quantities of exports of manufactured food in total food exports, and yet its significant role in industry's contribution to GDP, the food manufacturing sector has prospects for sustained economic growth. The expected gains may, however, not materialise because performance is challenged by the current inability of enterprises to comply with the basic food safety requirements of the global economy.

1.3.1 Structure of the Sector

The Ghanaian food sector comprises private, public and private partnerships and public institutions, working together to sustain the sector. The food product that reaches consumers at the end of the value chain goes through a series of stakeholders,

[5] Non-traditional products are products other than cocoa, gold and timber, and include processed and manufactured food.

who add some value to it before transporting it to actors further up the value chain (Figure 1-6).

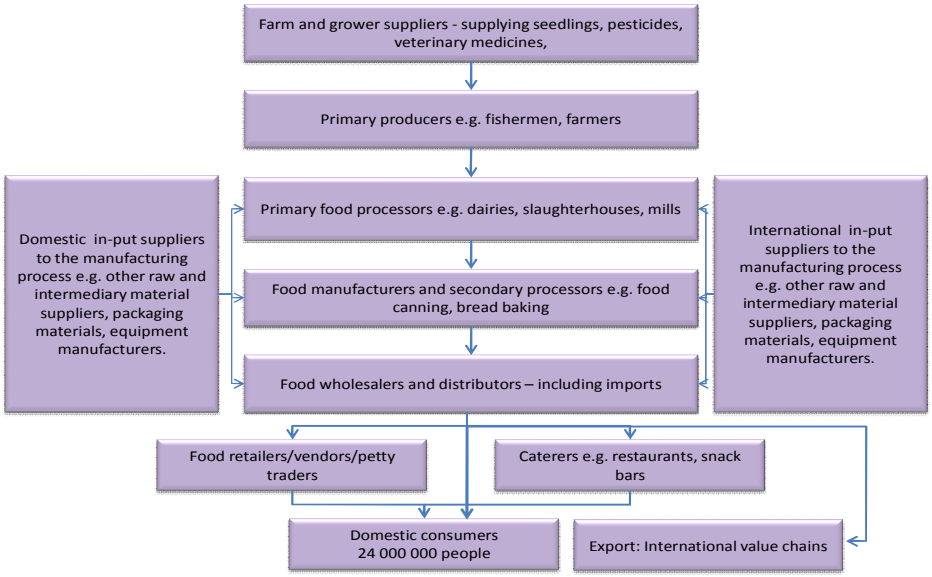


Figure 1-6: Food processing value chain in Ghana

These primary actors are supported by both domestic and international sector associations and institutions which provide a variety of support services.

Manufacturing activity is dominated by domestic small and medium enterprises (SMEs); nonetheless, there are large domestic enterprises, subsidiaries of international enterprises, and public-private large enterprises and SMEs, which have also contributed to the sub-sector's current status.

Modes of food manufacturing have been both informal and formal. Informal, in the sense that, the food product (e.g. vegetable oils) is manufactured and packaged in the local kitchen setting of owners of enterprises, with no specific manufacturing plant or layout that ensures quality or food safety. The more formal modes of manufacturing takes place in plants designed specifically for food manufacturing, and are registered as such. Unlike most value chain networks in the more economically advanced countries, there could exist from very simple to extensive networks, depending on the food product in question. This is attributable to a significant number of independent retailers/vendors acting in the domestic chain, introducing several tiers into the chain structure.

1.4 Overview of the Economy of the Learning Case: the UK

The UK economy ranks 7th in the world and has a GDP of $2.189 trillion (PPP) (CIA, 2011). The economy significantly depends on services, which is the highest contributor to GDP (Table 1-1). The UK has a population of approximately 63,000,000. The country has a labour force of 31.45 million (2010 est.), and services employ approximately 80% of the total labour force (Table 1-1 &Table 1-2).

According to the World Bank, the UK's economy falls within the high income band classification, as the country has a GNI per capita (PPP) of $35860 (2009 est.). Approximately 14% (2006) of the population are below the poverty line.

The food and drinks sector plays a significant role in the manufacturing economy. It is the single largest manufacturing sector in the UK; it represents over 15% of manufacturing turnover and employment (Improve, 2007; IFM, 2010).

Table 1-1 : Industry contribution to GDP

Industry	% contribution to GDP
Agriculture	0.9
Industry	22
Services	77.1

(Source: CIA, 2011)

Table 1-2: Industry contribution to employment

Industry	% contribution to employment
Agriculture	1.4
Industry	18.2
Services	80.4 (2006 est.)

(Source: CIA, 2011)

The sector is second in the world, only after Canada (Improve, 2007) and has more than 9000 enterprises, which purchase two-thirds of its agricultural produce. The UK food and drinks manufacturing value chain has a similar structure to that of Ghana, represented in Figure 1-6. According to the IFM (2010), the food and drinks manufacturing sector is very stable, and resilient (due to its export performance). The sector has a large R & D spend (over 4%) and generates a significant number of

products each year (IFM, 2010). The sectors' food safety assurance system has gone through a series of reforms to reach a current state where one can say it is relatively matured. With its rich experience in food safety it provides a great environment to examine.

1.5 Research Scope

The food industry as depicted in Figure 1-6 has several actors participating in one of the many sectors (e.g. food for humans and animal food), and interacting with agents which are external to the value adding activities in value chains. Against this background, the phenomenon of enhancing access, using high value-added products is investigated in the context of manufactured food for human consumption.

1.6 Research Proposition

The research proposition (Yin, 2009) underlying this study is that an enforced technical regulation drives compliance with food safety requirements (and by extension enhances access to the GFMVC); however, it is not a sufficient motivator, particularly in sectors dominated by small and medium enterprises (SMEs), and hence should be supplemented with other incentives that facilitate capability development at the enterprise level.

1.7 Research Aim and Objectives

The nature of the research problem suggests the need for a practice-oriented approach, which takes into account the contextual factors within the country of interest. The specific aim of the research is thus to:

"Understand the practice of developing food safety capability to enhance access to the global food manufacturing value chain (GFMVC) using high value-added products".

This will provide policy makers in developing countries struggling to define appropriate mechanisms to enhance access of their countries to the GFMVC with some lessons to inform appropriate policy decisions.

To ensure that this specific aim is realised, the following objectives were formulated:

1 To review relevant literature to understand the governance and controls executed in global value chains and their implications for developing countries accessing the global food manufacturing value chain (GFMVC).
2 Examine the specific experience of the UK, in the context of the current regulatory, institutional and policy frameworks and how that has impacted on the status of food safety.
3 Investigate the current state of the food safety assurance process in the Ghanaian food manufacturing sector, within the current regulatory, institutional, and policy framework, in terms of its capability to assure safe food.
4 Evaluate an appropriate regulatory, institutional and policy framework, with the potential to enhance food safety assurance in Ghana.

1.8 Thesis Structure

The thesis is structured around the four objectives outlined above. An overview of the chapter outline is shown in Figure 1-7. This chapter (***Chapter 1***) has discussed the context of the research, highlighting the over-dependence of the Ghanaian economy on its agricultural sector for economic growth. While recognising the uncertainties characterising developmental strategies designed around raw agricultural commodities for accessing global value chains, the chapter also acknowledges that qualifying to access the GFMVC is subject to compliance with international food safety requirements. Therefore making a transition from accessing GVCs with raw agricultural commodities to using high value-added food products from Ghana will require addressing the gaps in the current regulatory, institutional and policy frameworks.

Chapter 2 draws on existing literature to understand the current structure of global value chains (GVCs), the governance patterns associated with such chains and their implications for developing countries accessing the GFMVC.

Chapter 3 looks into the extant literature on food safety assurance in GVCs, particularly looking at regulatory, institutional and policy frameworks and their associated mechanisms for implementation.

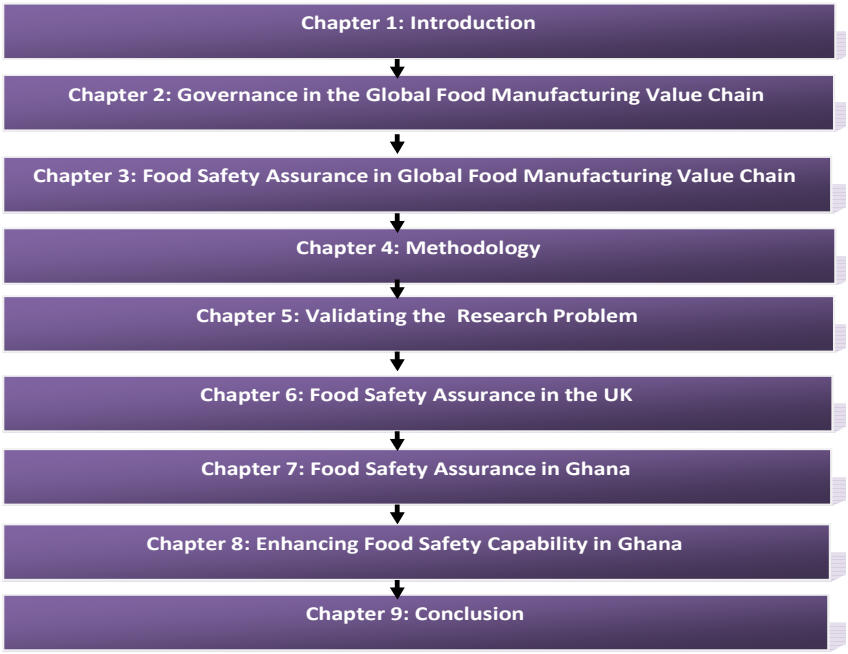


Figure 1-7: Outline of chapters

Chapter 4 discusses the methodology adopted for the execution of the entire research. The chapter gives an overview of some of the methodologies available, their underlying philosophical assumptions (on what is reality, what constitutes knowledge, the role of the researcher and the procedures adopted for research) and the rationale behind the choices made by the researcher. The research problem is validated in ***Chapter 5.***

Chapter 6 presents the results of the survey and case study investigations conducted with relevant stakeholders in the UK food and drinks sector, and the findings of the situational analysis conducted in Ghana is presented in ***Chapter 7***.

Chapter 8 draws on insight and knowledge from previous chapters to present a cross-case analysis, in the light of available regulatory alternatives, institutional and policy frameworks for assuring food safety, to propose options for Ghana. ***Chapter 9*** discusses the achievements of the research in the light of the set aim and objectives, and their implications for practice. The chapter also draws conclusions from findings and outlines potential areas for future research.

CHAPTER 2: GOVERNANCE IN THE GLOBAL FOOD MANUFACTURING VALUE CHAIN (GFMVC)

The chapter investigates the global context within which enterprises could potentially be integrated, and aims to understand the governance executed in the global food manufacturing value chain (GFMVC) and its implications for the access of developing country food manufacturers.

2.1 Definition of Concepts

The concept of ***'value'*** is central to the globalisation of industries (Gereffi and Korzeniewicz, 1994), and research into 'value' has revealed several dimensions of the concept. Clark (1915) introduced 'value' as the core of economic thinking and asserts that it is generally viewed as abstract and subjective. Bowman and Ambrosini (1998) equate value to perceived value in monetary terms, as the price a customer is willing to pay for the product if only a single source of supply exists. This judgment is premised on an appraisal of the product's value and the willingness of an individual to pay. The authors argue that these monetary judgments cannot, as a result, be made in isolation from the wider needs and economic circumstances.

Methodologies used to identify different dimensions of value provide clearer estimations of what is transformed or perceived, however, they still rely on how outputs are assessed (Otter, 1992). The notion of ***'value'*** used in this study has its roots in the transformation process and is conceptualised as ***"the transformation of materials into items of greater value by means of one or more processing and/or assembly operations"***(Groover, 2006).

According to Normann and Ramirez (1994), every enterprise occupies a position on a value chain; upstream suppliers provide inputs to an enterprise which adds value to these inputs, before passing them downstream to the next actor in the chain, and eventually, the product is passed on to the consumer.

The terms ***'value chain'*** and ***'supply chain'*** are used interchangeably. For many, these two terminologies complement each other, in the sense that they both give a view of

an extended enterprise with integrated business processes, enabling the flow of products and services in one direction, and of value as represented by demand and cash flow in the other. Both chains cover the same network of enterprises, which interact to provide products and services to customers (Figure 2-1*)*. However, there are differences which arise essentially from the focus of each concept. The term ***'supply chain'*** is commonly used to encompass every effort involved in producing and delivering a final product or service, from suppliers to customers, with a focus on the costs and efficiencies of supply, and the flow of materials through the chain (Feller et al., 2006).

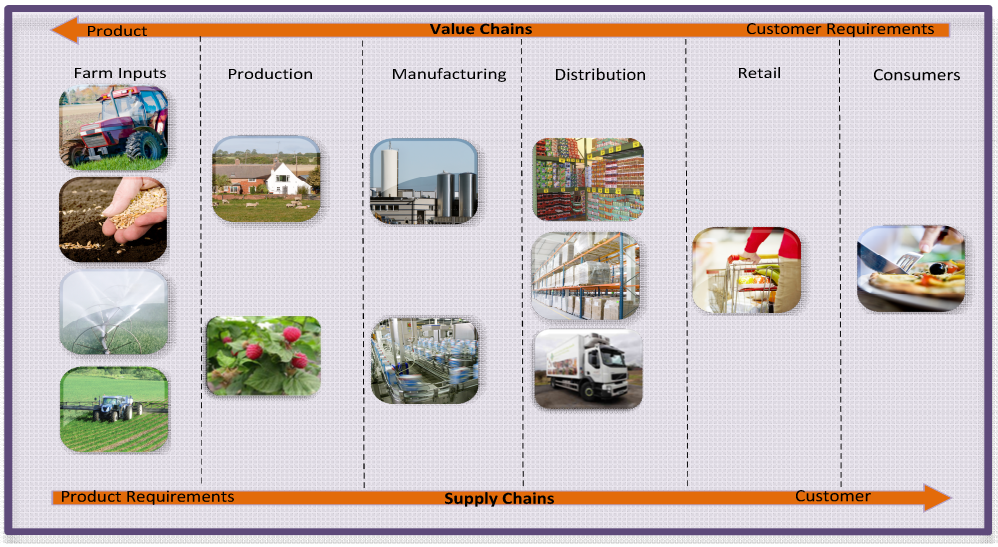


Figure 2-1: Differences between value chains and supply chains

Supply chains focus on the downstream flow of goods from the supplier to the customer. In value chains, value flows from the customer in the form of requirements and orders to a supplier. Hence the focus of value chains is on the value that accrues to customers and the interdependent processes that generate that value (Feller et al., 2006).

A ***value chain*** therefore spans the whole transformation process (made up of value adding activities): from raw material supply to how raw materials are transformed into manufactured goods, and the improvements in quality associated with both raw materials and manufactured goods (Subramanian, 2007). Extensions to this definition have been made by Osei (2007), who associates interactions (linkages) that exist

among value chain processes and external entities (e.g. governmental and non-governmental institutions) with value chains.

Different frameworks of value chains have emerged over the past two decades. The earliest of which was developed by Porter in 1985. The framework is generic and comprises nine activities: five 'primary' and four 'support' activities. The primary activities are the physical activities that deliver the product to the customer, and provide after sales support. The primary activities make use of support activities that help to execute the overall functions of the enterprise. The broken lines in Figure 2-2 indicate the fact that procurement, technology development and human resources management is associated with specific primary activities and yet still support the entire value chain; however, enterprise infrastructure is not associated with any particular primary activity but supports the entire chain (Porter, 1985).

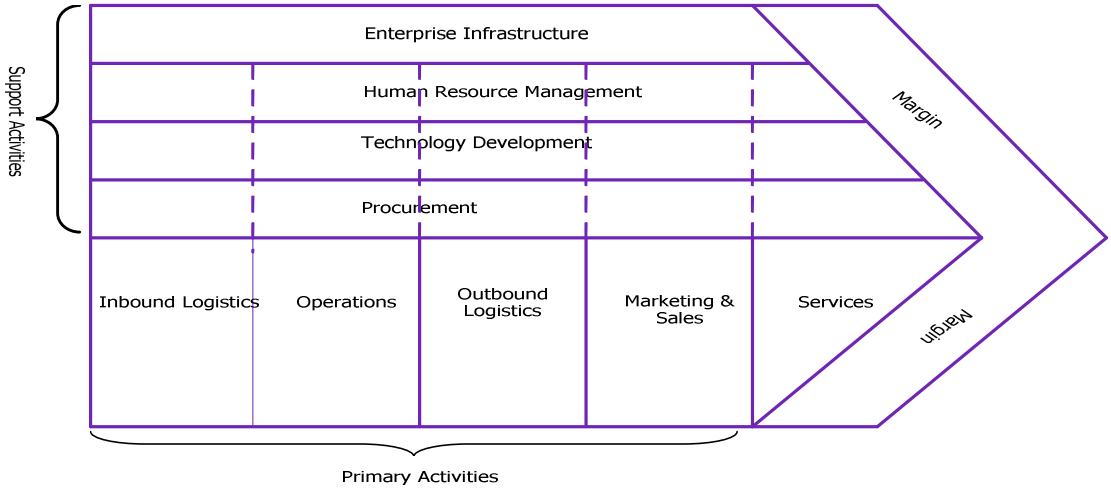


Figure 2-2: Porter's value chain

According to Porter's value chain model, an enterprise's value chain is enclosed in a larger network of activities: a ***value system***. This value system is primarily made up of the supplier's value chain, the channel value chain (the chain that delivers the product to the buyer) and the buyer's value chain (includes the customer), which are held together by relationships or linkages. Within the value system, value is added to the product at each stage of the different value chains.

Porter's generic value chain has been the basis for later models which have also attempted to extend the value chain concept into global spheres. Popular models

include the global commodity chains (GCCs), (Gereffi and Korzeniewicz, 1994; Gereffi, 1999); global value chains (GVCs), (Raikes et al, 2000); World Economic Triangle (WET), (Messner, 2002); and the basic value chain, (Schmitz, 1999; Sturgeon, 2001; Humphery, 2006). According to the later models, trade in the global economy is realised through relationships or linkages that exist among different enterprise-, industry- and national value chains. The extension of the vertical linkages existing within value systems beyond national boundaries of the parent enterprise is what is known as ***global value chains*** (Figure 2-3). In other words, it is a configuration of coordinated activities divided among enterprises, and has a global reach (Gibbon and Ponte, 2005). The term '***global value chain analysis'*** has hence emerged to extensively explore the key elements and relationships among various actors involved in value chains and the implications of such relationships on the development of chain actors and their host countries.

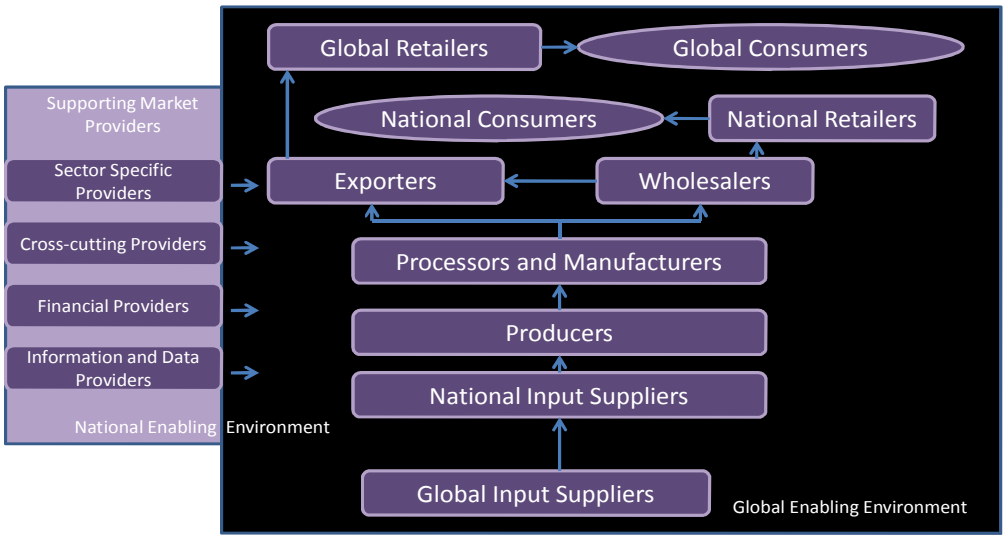


Figure 2-3: Overview of a global value chain

(Source: ACDI/VOCA, 2006)

Characterising the extension of enterprise-, industry- and national, value chains into the global context is the emergence of disintegration of manufacturing processes and their re-integration through inter-enterprise trade. These trends are characterised by dynamics initiated and implemented in particular forms due to strategic actions and decision-making by particular chain actors (Gibbon et al., 2008), often known as ***lead***

enterprises, which manage access and integration into GVCs. The lead enterprises and their various tier-suppliers are in turn subject to a wider institutional framework of governance executed by public and private sector regulators. The term ***'governance'*** hence refers to ***'the content and the management of decisions across all suppliers and sub-suppliers, the strategies behind the decisions taken and management methods chosen to implement them, and the systems through which their outcomes are monitored and reacted to'*** (Gibbon et al., 2008).

2.2 Governance in the Global Economy

Different perspectives exist on the governance of the global economy. The main stream international political economy state global economic governance in terms of institutions (e.g. World Trade Organisation), and is primarily concerned with their power and effectiveness *vis-à-vis* regional and national governance systems (Gibbon et al., 2008). The second perspective, which is posited by the radical political economy, focuses on the relationship between global capital (particularly, multinational corporations), the institutions mentioned above and actors such as the World Economic Forum, which represents the interest of both corporations and some governments (Gibbon et al., 2008). According to the authors, these two perspectives are both divided on how effective global economic governance is, in whose interest it is, the mechanisms of governance and their implications for the different actors within the global economy. The perspective adopted by GVC analysis is an enterprise-centred approach to governance, with emphasis on the role played by lead enterprises, as core actors in global economic governance. Global value chain analysis recognises that international organisations do influence economic outcomes, and this is not attributed to pressure by lead enterprises but rather through the impact of regulations on how lead enterprises organise manufacturing networks. Chain governance is of significant importance because even with the removal and in some circumstances, diminishing barriers to international trade, developing country actors do not get automatic access to GVCs. Hence understanding chain governance brings to light the avenues and scopes of action available to developing countries.

2.2.1 Stages within Global Value Chain Interpretations of Governance

Three forms of governance are discussed in global value chain literature: governance as driving, governance as coordination and governance as normalisation. This section discusses how each of these forms of governance are conceived, their applications and limitations in practice.

2.2.1.1 Governance as Driving

Governance within GVCs has received different conceptualisations. Gereffi, (1994) defined governance as the "*authority and power relationships that determine how financial, material, and human resources are allocated and flow within a chain".* This notion perceives of governance as the interactions characterising supplier-buyer relationship, in which one actor principally drives actions within the chain. He distinguished between two distinctive global commodity chains when he discussed governance patterns in the GVC literature. These are producer-driven commodity chains and buyer-driven commodity chains. In Gereffi and Korzenievicz (1994), he distinguished between these two commodity chains using factors of production, the nature of entry barriers and value chain actors. Producer-driven commodity chains are characterised by capital- and technology-intensive commodities such as automobiles, aircraft and consumer electronics. The barriers of entry are often located in large-scale, high-technology production facilities involving huge investments, high-technology and economies of scale. Coordination in such chains is usually accomplished by large multinational manufacturing corporations. Products are usually made to order. Under circumstances in which this is not the case, they are dependent on publicly managed demand (Gibbon et al., 2008). Hence, suppliers are often tied together rather than internally competing. Producer-driven chains are closely integrated with established markets and hence geographic division of labour is less pronounced.

Buyer-driven commodity chains on the other hand have large retailers who coordinate geographically dispersed and decentralised production networks, which are

functionally integrated (Plahe, 2005). In comparison with producer-driven chains, buyer-driven chains are said to be characterised by labour-intensive consumer goods like food, garments, foot wear, house wares, and have low barriers to entry into production (Gereffi, 1994). Lead enterprises in such chains tend to focus on high value adding functions of the business, e.g. research, design and marketing, and organise manufacturing through networks of suppliers and contractors which are independent of lead enterprises, and make the products under established brand names of retailers. The lead enterprises driving buyer-driven chains' concept of governance was developed in a number of empirical studies, which demonstrated the extent to which lead enterprises define specifications for their independent suppliers (the majority of which are in developing countries), and explored the implications of the activities of these global buyers in either facilitating or limiting particular outcomes for suppliers - e.g. enterprise-level technological learning and upgrading (Schmitz and Knorringa, 2000).

The producer- and buyer-driven dichotomy had an underlying key assumption that governance was a function of lead enterprise type, where manufacturers drive producer-driven chains, while buyer-driven chains are driven primarily by retailers. The framework of governance posited by Gereffi, (1994) has been critiqued by many researchers (Gibbon et al., 2008) and at the same time has spurred new debates and new conceptualisations of GVC governance (Gibbon, 2001; Fold, 2001; Ponte, 2002; O'Riain, 2004).

In the years following the publication of the producer- and buyer-driven dichotomy of governance, the burgeoning field of global commodity chains made numerous contributions, either to affirm or dispute the relevance and utility of the model (Gibbon et al., 2008). The theory was criticised for being too narrow or excessively abstract, lacking the ability to accommodate the range of governance forms observed in practice. Buyer-driven dynamics seemed to emerge across almost all industries, and hence the distinction between the two types of driving was redundant. It was realised that in some value chains that were formerly recognised as producer-driven e.g. consumer electronics and automobile value chains, producers had graduated to out-

sourcing sub-systems and even final assembly, in addition to manufacturing, but kept control of functions such as marketing in-house. Furthermore, global contract manufacturers have become prominent in electronic products, and were also emerging in the auto parts and food processing industry. Particularly in the agricultural sector, contract manufacturers are important parts of the cocoa and chocolate network, where branded chocolate manufacturers are increasingly outsourcing the supply of cocoa intermediary products.

The definition of the concept 'buyer' was also criticised, as it covered a variety of lead enterprises, who may drive chains in different ways; as buyers included retailers, branded marketers, industrial processors and international traders, and hence the levels of 'driveness' varies across these chain actors. Among other criticisms, the model was also criticised for excluding external actors who may have an influence on how value chains are governed, but do not directly supply a product or service (e.g. certification bodies, and NGOs).

The early GVC literature (Gereffi, 1994) suggested that the value chain functions which were outsourced by lead enterprises in buyer-driven chains were low-profit and non-core. However, Sturgeon (2001; 2002) argued that this was not necessarily so. According to the author, the functions offloaded by brand-named manufacturers to their global contract manufacturers were not necessarily low profit, and hence the manufacturers who executed those functions should not be perceived as being driven in the same way as sub-contractors making products to the specifications of retailers. This is because the contract manufacturers were highly competent, taking responsibility for a full range of services without significant support from or dependence on lead enterprises, and hence could be considered as turn key (Sturgeon, 2002).

2.2.1.2 Governance as Coordination

Given the limitations of the original conceptualisation of governance in Gereffi, (1994), and inspiration from Sturgeon's concept of turn key suppliers in value chains (Sturgeon, 2002), new concepts of governance were developed in terms of 'inter-

enterprise relationships and institutional mechanisms through which coordination of activities, which are non-market, are achieved in value chains. Against this backdrop, Gereffi, et al., (2005), came up with a more elaborate theory to specify the determinants of a broad range of inter-enterprise governance structures in global industries. Gereffi and his collaborators developed the governance framework based on the values (either high or low) of three independent variables:

1. The complexity of the information and knowledge required to sustain a particular transaction;
2. The ease with which this information can be codified and efficiently transmitted between trading parties;
3. The existing capacities of potential supply bases in relation to the requirements of the transaction.

After eliminating three governance structures as not being probable, five possible categories (Figure 2-4) of inter-enterprise governance remained: market, modular, relational, captive and hierarchy.

a. *Market:* when transactions are easily codified, product specifications are simple and suppliers have the capability to produce products without needing much input from buyers. This leads to market coordination. Parameters are defined solely by each enterprise at its point in the chain, and hence market demand is estimated through forecasting and using a design that has no reference to any particular customer. As a result, the buyer encounters a ready-made and ready-to-buy product.
b. ***Modular value chains***: when the ability to codify specifications extends to complex products and suppliers have the capacity to use generic manufacturing competencies to supply packages and modules, lowering the need for buyers to monitor closely and control design.

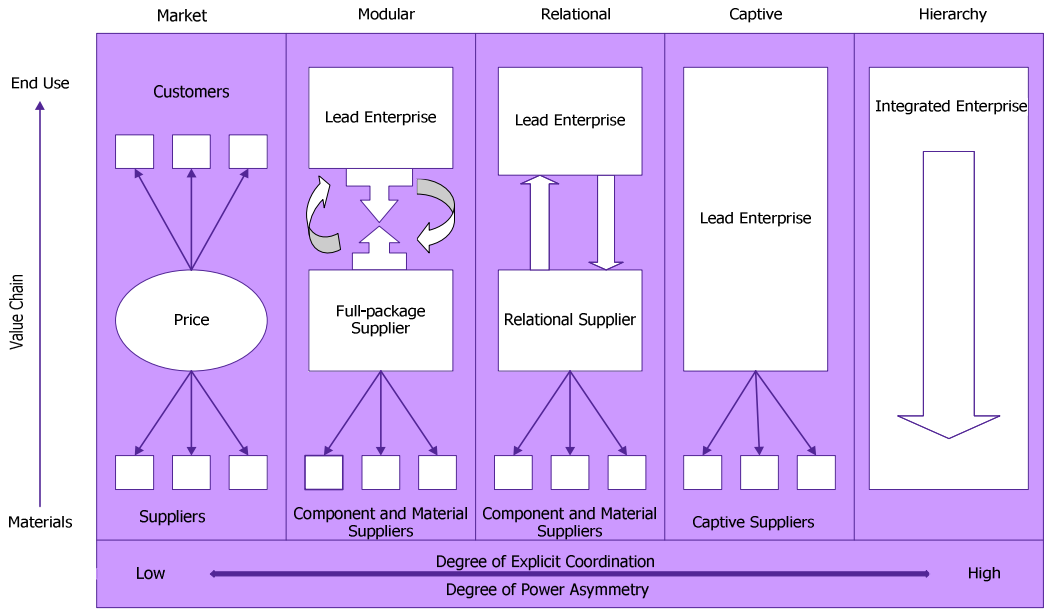


Figure 2-4: Governance in global value chains (GVCs)

(Source: Gereffi et al., 2005)

c. ***Relational value chains***: when product specifications cannot easily be codified, products are complex and supplier capabilities are high; this leads to mutual dependence between supplier and buyer, which may be regulated through reputation, social ties and/or spatial proximity.

d. ***Captive value chains***: when there is ability to codify complex product specifications but the capability of suppliers is low; this leads to a higher degree of monitoring and intervention by the buyer and to a transactional dependence of the supplier on the buyer.

e. ***Hierarchy***: occurs when product specifications cannot be codified, products are complex and competent suppliers are not available; as a result the buyer has to develop design and production skills in-house.

This framework captures important elements that influence the forms of coordination between chain actors in different functional positions in a GVC, however, it is limited in terms of explaining the overall forms of governance realised in value chains. Apparently, this coordination conceptualisation of governance is no longer referring to strategies and actions by particular actors who drive value chains along its entire length, but rather forms of coordination characterising inter-enterprise exchange (between lead enterprises and first-tier suppliers) at specific nodes in the chain.

In addition to this, the model placed more emphasis on the industry or process characteristics shaping the governance relationship.

2.2.1.3 Governance as Normalisation

This conceptualisation of governance as 'coordination' was also critiqued as it was further observed in practice that even in particular value chains, more than one of the forms of coordination proposed by Gereffi et al.,(2005) could exist between actors at different functional nodes. For example, in the coffee value chain, market relations are observed in the link between retailers and roasters, modular relationships link roasters and international traders, and a hierarchy (vertical integration) is often observed at the interface of the international trader-exporter functions (Gibbon et al., 2005). The domestic value chains in producer countries are structured on the basis of a mixture of hierarchical, market and relational links, however, the overall value chain is buyer-driven and coffee roasters play the lead role in defining the key terms of participation. Furthermore, the notion of governance as coordination proposed by Gereffi et al., (2005) further narrows the explanatory scope of governance from the length of a chain in the governance as 'driving' perspective to a specific node in the 'governance as coordination' conceptualisation. The latter depicts governance as a solution to structural and technical challenges between enterprises at a specific node. The models by Gereffi (1994) and Gereffi et al., (2005) further narrowed the scope of analysis and excluded from the framework the effects of external institutional and legislative frameworks within which even lead enterprises operate (Raikes et al., 2000). Ponte & Gibbon (2005) also argue that there are some GVCs in which public regulation and trade policy instruments are important and as such, institutional and legislative frameworks may be reshaped through lobbying public agencies or influencing negotiation processes. Particularly, where product definition, quality and safety standards are concerned, lead enterprises may concentrate efforts on developing standards, which may be incorporated into regulations (could be voluntary, *de facto* mandatory or mandatory). The insights provided by Gibbon and Ponte (2005) suggest that the concept of governance in GVCs goes beyond inter-enterprise relationships,

the mechanisms and processes associated with such relationships, how enterprises make decisions on attribution of functions to chain actors, or even the effects of changing trade agreements and public regulations. This is because the concept of governance in GVCs could also include another critical dimension – the influence of social norms. Social norms arise from the habits of thinking and acting internalised by individuals, and hence there is no influence of lead enterprises or even governments, and these have become very prominent in the governance of value chains.

Ponte & Gibbon, (2005) draw on insights from the convention theory[6], to inform a more elaborate account of governance in GVCs, that incorporates the wider cognitive and normative contexts of buyer-supplier relationships. This leads to the conceptualisation of governance in GVCs as 'normalisation'. The term 'normalisation' is used here to mean the act of realigning a given practice so that it mirrors or materialises a standard or norm (Gibbon et al., 2008). Governance as normalisation conceives of the concept through the lenses of governmentality, and depicts it in terms of models of practice, interpreting it through economic agent's descriptions of their own governing (or governed) practices (Gibbon et al., 2008).

Convention theory posits economic action as a system of justifications (Boltanski & Thevenot, 1991 as cited by Gibbon et al., 2008), which provides vocabularies for identifying and describing on the one hand, the objects of economic action and on the other, criteria for attributing functions and values to them (Gibbon and Ponte, 2005; Gibbon et al., 2008). According to Gibbon & Ponte (2005), each system of justification is organised around different types of qualifications and forms of justification and challenge. In economic terms, different markets use different criteria to qualify and manage goods for trade, over time. Accordingly, different forms of coordination emerge in relation to which quality conventions regulate specific markets, sectors, or value chains. Hence the use of different criteria or standards to characterise how products are qualified for trade would probably change the dominant form (or combination of forms) of coordination.

[6] Conventional theory, like GVC analysis provides key elements for understanding of changes in the global economy (Gibbon et al., 2008).

Up to this point, an explicit distinction between coordination and the overall governance of value chains has not been established. It has also been difficult to define governance to include all the elements and processes that the different researchers have described. Making governance the subject of dynamics based on inter-linkages between trade rules and quality conventions at one end and the processes internal to value chains on the other, poses a major challenge in terms of remodelling the analysis of GVC governance to reflect these two components. Gibbon & Ponte, (2005) suggest that recasting should begin with distinguishing between coordination and overall forms of governance. According to the authors, when analysing overall forms of governance, the producer-buyer driven models still remain valuable both for descriptive analysis of historical processes and as a typological device. However, one descriptor cannot capture the complexity of value chains existing in practice. As a result it might be more useful to attempt to fine-tune the concept, by adding underlying components to its description and making predictions about the future based on historical dynamics.

In an attempt to understand the scopes of action open to domestic enterprises in the global economy, Messner (2002) developed the World Economic Triangle (WET). The model (Figure 2-5) posits that global economic governance is shaped by market coordination, intergovernmental negotiation systems that define global rule systems and several public-private and private networks of governance. The latter is governed by lead enterprises and global standard setting policy networks. This view of governance is partly consistent with the governance structures posited by Gereffi et al., 2005, in the sense that the author acknowledges the presence of governance structures similar to pure market structures, and hierarchies, and presents a notion of the existence of quasi-hierarchical governance structures (relational, captive and modular governance structures). In addition to these, the model also acknowledges the presence of global policy and domestic network[7] of governance.

[7] Networks comprise clustering of domestic enterprises, which pull together complementary competencies to produce a product.

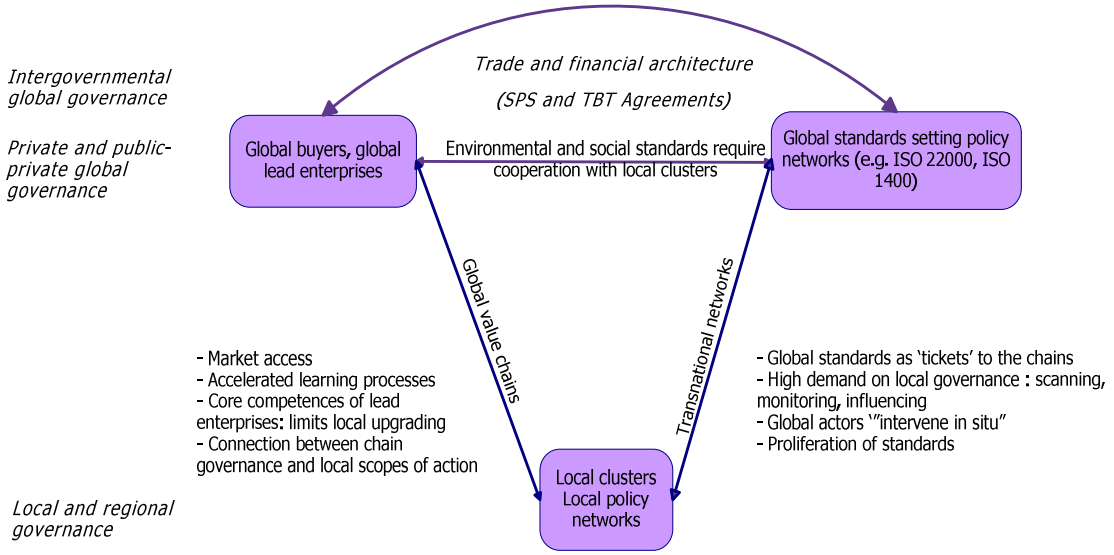


Figure 2-5: World Economic Triangle (WET)

(Adapted from Messner, 2002)

According to Messner, (2002) local and regional locations are also tied into global (e.g. technical, social and ecological) standards developed and monitored, and sometimes even sanctioned by global policy networks. This extended view of governance in the WET also acknowledges the influence of social norms and the wider cognitive and normative dimensions of governance suggested by Gibbon and Ponte, (2005) and provides a more elaborate view of governance within which to position this research.

2.2.2 Mechanisms of Governance in Food Manufacturing Value Chains

The preceding section on governance has established that attempting to define governance in GVCs to encompass all the elements and dimensions that qualify as governance will be very difficult, if not impossible. The purpose of this section is not to define governance in the GFMVC but to draw on empirical literature to establish how food value chains are governed.

The literature on food reflect the fact that a variety of stakeholders (Figure 2-6) play different roles in its governance at different levels, and adopt mechanisms that impact on the behaviour and functions of actors in the chain. The mechanisms could be voluntary (includes public pressure), *de facto* mandatory (includes value chain pressure) or mandatory.

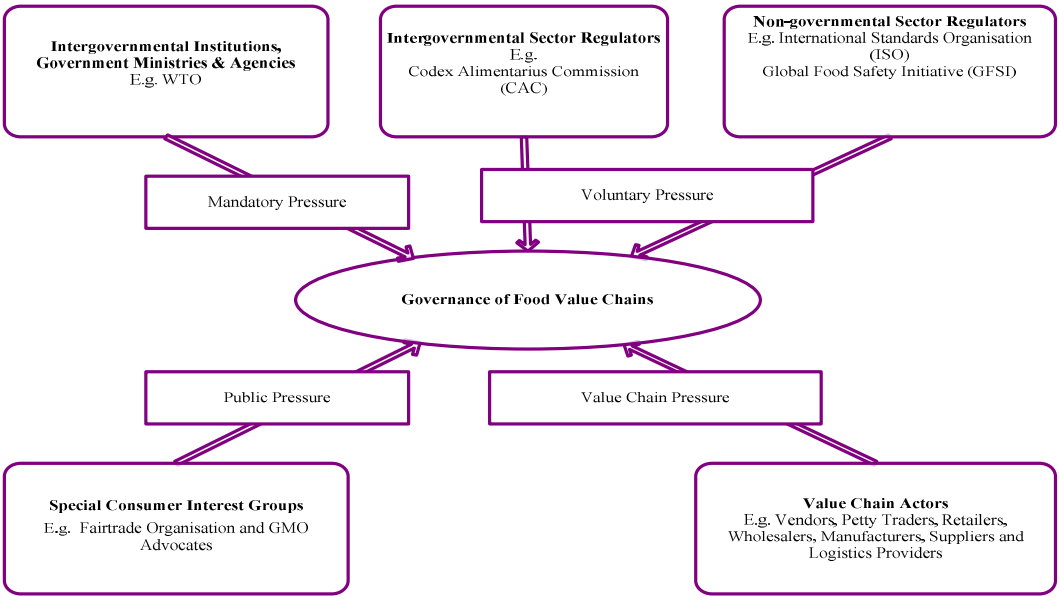


Figure 2-6: Stakeholders in the governance of food value chains

Furthermore, the concept of governance involves decision making concerning chain membership, by actors often known as lead enterprises. These actors have the power and capacity to incorporate other actors to perform value-added functions they relinquish, or alternatively exclude other actors.

Rules and conditions of participation that relate to what is produced, how it is produced, how much is produced, when are the key operational mechanisms of governance.

The decision to integrate a particular supplier into the GFMVC is made upon consideration of a variety of factors. Lead enterprises make initial decisions based on a demonstration of compliance with pre-specified requirements, also known as order qualifiers (e.g. food safety, social and environmental standards) of the international market before giving consideration to order winners (price, reliability, and geographical position). Compliance with the order qualifiers are often verified by a variety of conformity assessments[8]. Assessments may be conducted in three ways, depending on the body which carries out the process.

[8] Conformity assessment means checking whether products, services, materials, processes, systems and personnel measure up to the requirements of standards, regulations or other specifications

a. 1st party: This is where a supplier assesses itself against the relevant requirements and makes a declaration of conformity. This is often called the Supplier's Declaration of Conformity (SDoC)
b. 2nd party: A customer or buyer assesses the object against the relevant requirements.
c. 3rd party: An independent certification body assesses and certifies another organisation or object, and issues a certificate. This is normally called certification or registration.

The decision to use one type of conformity assessment over another depends on a number of factors: e.g. customer's (retailers') requirements, the existence of statutory legislations in target export market. If a sector is governed by statutory legislations that impact on transactions in the value chain, the decision to choose one form of conformity assessments may be taken out of the hands of the two trading parties (the supplier and the customer), and proof of conformity, in a prescribed format may be required. If the transaction between the trading parties is governed by voluntary regulations, the trading parties are free to decide which form of conformity assessment procedures to adopt. However, in larger transactions, where the risk of mistakes is higher, third party conformity assessment providers are required to provide trading parties with an unbiased and factual assurance to both trading parties (GSB, 2008). For participation in global value chains, the third party option is often required to add credibility and increase consumer confidence in claims made by trading parties. Accordingly, all enterprises, regardless of size, scope of activities or geographical position, are required to have relevant certification to international standards to enhance their prospects of access to the GFMVC.

The point of integration along the chain is partly decided on, based on the core competence of lead enterprises and their functional investments. Some lead enterprises (e.g. Nestle and Cadbury) have invested significantly in production plants, R & D and marketing facilities, and hence the points of integration for domestic enterprises are often in either raw material supplies or low value-added intermediaries.

On the other hand, there are also lead enterprises[9] (e.g. Kraft Foods, Petra Foods and Barry Callebaut) which are vertically integrated and hence there is limited chance for the integration of domestic suppliers into significant value-adding functions.

In the GFMVC, the actors with the highest degree of power are mostly retailers in buyer-driven chains (Gereffi & Korzeniewicz, 1994). Lead enterprises in such chains decide on who gets access to the final consumer, because of their significant shares in the sales market and their functional investments. And this includes deciding on whether the products of even lead enterprises like Nestle, Kraft Foods get access to the final consumer. The trend of own-brand products for retailers has provided opportunities for the integration of domestic suppliers from developing countries into higher full value-added functions. Prospective enterprises are integrated to take charge of full production of particular foods, premised on their competence to produce consistently high quality, safe foods.

Lead enterprises and the suppliers they govern are tied into regional and global structures which develop rules that govern international trade. As a result, the key parameters for production can also be influenced by intergovernmental agents, as depicted by the WET (Figure 2-5), who are external to the value adding activities within value chains (e.g. The World Trade Organisation (WTO)). Member States of these institutions sign agreements which, when enforced through a variety of mechanisms, become measures of governance in the global food economy. The outcomes of the negotiations, which are usually multilateral agreements, once signed, are binding on Member States, and provide the legal ground-rules for international trade (WTO, 2008). Running alongside the multilateral agreements are a series of regional and bilateral trade agreements developed for regions and between nations (e.g. the European Union (EU) and the Association of Southeast Asian Nations (ASAN)), by which countries and their food manufacturing enterprises (including lead enterprises in such chains) who desire to trade with such regions need to comply with. Some international non-governmental and public-private global organisations have also developed

[9] It is realised that some of these lead enterprises in the global food manufacturing value chain are increasingly but strategically outsourcing main value-adding functions to enterprises in developing countries. This is very common with the cocoa and coffee value chains.

international standards (e.g. food safety, environmental and quality standards), based on codes of good practice, to provide guidance on procedures and systems appropriate to achieve same objectives as multilateral and regional trade agreements, and these are increasingly being used as the basic minimum requirement or qualifiers for prospective actors.

Countries have responded to the relevant governance frameworks and are implementing varying degrees of controls based on proposed international standards, to enhance compliance of chain actors with set requirements. In response, the private sector in developed country domestic markets have also developed a variety of business-to-business (B2B) standards, which seek to minimise transaction costs and provide a mode for proving due diligence, as required by most statutory regulations.

Drawing on the framework of governance developed by Messner, (2002) (Figure 2-5 above), it is fair to say that the governance patterns within the GFMVC influence the scope of action open to domestic enterprises (most often in developing countries), and for that matter, access and participation modes.

2.2.2.1 Food Safety Requirements in Value Chains

Among the various order qualifiers impacting on the prospects of prospective enterprises being integrated into the GFMVC, food safety has emerged as the single most important basic requirement (Canavari et al, 2010). This is because it is believed that all consumers have a right to safe food as declared by the Universal Declaration of Human Rights, 1948, and to ensure that this is made operational in practice, systems and rules need to be implemented to guide the behaviour of relevant actors. The section, therefore, focuses on food safety requirements in the GFMVC.

Food safety requirements are continuously evolving, with advances in production processes and technologies, new and emerging food safety risks and the increasing openness of most countries to trade. The evolutions are further motivated by changing consumer tastes and preferences, increasing consumer awareness and disposable income. Regardless of the above drivers, the role of the impact of the food safety crises (section 1.1) that characterised the food economy in the 1980s in the changes in

food safety requirements cannot be under estimated. This is because failures in the food system signalled to regulators that existing measures for the protection of consumer health and safety were inefficient and ineffective (Henson & Jaffee, 2006). Public outcry for improved measures has hence led to the application of more stringent measures of control.

Global Requirements

The two primary agreements relevant to the protection of public health and safety at the multilateral level are the Sanitary and Phytosanitary (SPS) and the Technical Barriers to Trade (TBT) Agreements. Both agreements establish a framework of rules and disciplines to guide international trade, with the explicit aim of preventing discrimination of any form or kind against any Member States[10] (WTO, 2008).

The SPS Agreement was formulated by the WTO to establish the basic multilateral rules that recognise the legitimate need for countries to adopt food safety measures in pursuit of public health protection. By so doing, no country is unduly restricted from participating in global value chains. The SPS agreement endorses the use of international standards, based on Codex Alimentarius Commission's (CAC's) recommendations as a control measure for food safety, and requests that importing countries with regulatory standards more stringent than international standards, justify both scientifically, through risk-based assessments (SPS Agreement, Article 5, paragraph 1), and/or economically (SPS Agreement, Article 5, paragraph 6), through systematic quantified assessment of the costs and benefits of proposed food safety regulations (Henson & Caswell, 1999). The Agreement gives countries a wide scope of application in setting and applying legitimate measures and this could be a source of practice complication; even though scientific justification is called for under circumstances where agreed international standards do not exist, there exist a broad range of risks for which scientific knowledge is incomplete (Roberts, 2004). Furthermore, differentiating between what is legitimate and non-legitimate is problematic in practice (Henson & Jaffee, 2008).

[10] There are 153 Member States globally and 30 Observers. With the exception of the Holy (Vatican), observers are expected to start accession negotiations within five years of becoming observers.

The TBT Agreement on the other hand, provides a framework that guides Member States in reference to the preparation, adoption of both Technical Regulations and Standards, as well as the conformity assessment procedures associated with Technical Regulation and Standards, *inter alia*. The SPS Agreement was enacted following the Uruguay Round of multilateral trade negotiations (Henson & Wilson, 2005) and aims to mitigate the effects of food safety regulation applied by WTO Member States on international trade, by advocating harmonisation, equivalence, and transparency, *inter alia*. All Member States of the WTO are expected to comply with the requirements of the SPS Agreement as well as the TBT Agreement at the multilateral level. It is hoped that if these measures proposed by the agreements are complied with, international trade will be equitable, bringing gains to all involved.

Regional Requirements

Compliance with the above requirements is onerous, however, in addition to these, regional integration has also presented more challenges for developing countries and their exporters, through yet again more regional requirements. With the creation of frontier-free single markets e.g. in the European Union (EU), have come food safety requirements that have been harmonised in the public sector, and are applicable in a variety of different countries. For instance, as part of the aims of the EC to enhance trade among its Member States, the European Union (EU) has laid down harmonised requirements governing food safety, and particularly, hygiene, throughout the value chain. For most commodities, national regulators must demonstrate to the EC assessors that existing mechanisms and infrastructure for the control and governance of food safety are at least equivalent to those of the EU (Henson & Mitullah, 2004). Following an assessment of current institutional mechanisms and structures, export clearance is awarded together with the appointment of a 'Competent Authority' (95/190/EEC) to govern the domestic value chain of the particular commodity. Manufacturing plants are required to implement hygiene controls based on Hazard Analysis and Critical Control Point (HACCP), and are expected to be inspected and approved regularly on an individual basis by the 'Competent Authority', appointed by

the EC, within the host country. Countries for which export clearance is awarded for particular commodities are subject to reduced physical inspection at EU borders.

National Requirements

The requirements of the global and regional agreement on food have been designed into measures in countries by which compliance is non-negotiable. Countries are using various forms of technical regulations and voluntary standards to assure food safety, and compliance may be mandatory, *de facto* mandatory, or voluntary, for trading partners. Some of these measures, coupled with the desire of chain participants to protect their reputation and brand image has motivated a series of initiatives from the private sector. Standards that seek to specify the basic requirements for access and participation in the GFMVC are becoming increasingly common, and for some retailers, the minimum threshold has even been raised higher (to ensure differentiation), making access and participation to those particular chains a preserve of those who appreciate the need for enhanced standard requirements.

2.2.3 Impact of Food Safety Requirements on Value Chain Governance

Over the years, approaches to food safety based on establishing effective hygiene control and product certifications (performance-based approaches) were the order of the day, realised through sampling and end product testing. However, these approaches are fraught with problems that make it difficult to assure food safety. It is said that such tests give the process controller a false sense of being in control, while in effect, they have varying chances of finding an actual hazard (FAO/WHO, 2005b). Hence, even though some of these conventional techniques are still being used to verify specific levels of certain food safety hazards, there has been a major shift towards preventive control systems or integrated process-based techniques. These approaches are based on 'codes of good practice', particularly on HACCP, Good Hygiene Practices (GHPs) and Good Manufacturing Practices (GMPs). Food safety control presently combines both performance-based approaches and integrated process-based approaches (e.g. risk analysis, regular audits, assessment by third party auditors, and accreditation), both in the public and private sector (Hanak et al., 2000).

These include stricter norms on food additives, chemical hazards (e.g. pesticides and veterinary drug residues), as well as specified, allowable levels of biological hazards.

Voluntary inspections of requirements by suppliers are almost giving way to mandatory legal frameworks in the form of Acts and Directives in the public sector. Retailers were using a hands-on governance and control approach, to ensure that manufactured food products conformed to specific requirements. This mode of assuring food safety required that customers collaborated with their suppliers in the quality assurance process, by providing the technology or technical competence for managing the safety and quality of food. These approaches have almost given way to recognised certification frameworks (hands-off), which set out the basic minimum requirements of food safety acceptable in the global food industry, and require supplying enterprises to be certified by third party auditors, before qualifying to supply food. Such certifications may be voluntarily or mandatorily sought by suppliers. However, with increased legislation of food safety controls and management in the public sector, voluntary requirements in the private sector are increasingly becoming mandatory, as without certification, enterprises may not get to access or participate in the GFMVC.

With the evolving stringent requirements for food safety have come a series of trends which have in turn affected the way in which food safety is assured and managed. It is not claimed that the following trends are exhaustive, but it does provide a series of apparent elements characterising the evolutions of food safety.

2.2.3.1 A Proliferation of Standards

There has been an increase in the number of standards that seek to promote food safety. This is true for both the private and public sectors. Even though there are some overlapping requirements, particularly in the mandatory use of HACCP-based systems, there remain significant differences in the food safety standards and in the conformity assessments procedures between markets (Henson & Jaffee, 2006).

There are also variations among the standards that developing countries must meet in order to gain and maintain access to developing country markets (Henson & Mitullah,

2004). For instance, the requirements governing the US fish and fishery sector are different from those used by the EU, and even in the Japanese market (Henson & Jaffee, 2006). Alongside the inter-country variation in food safety standards are the variations between private standards developed by retailers and other chain actors, in terms of controls required and the associated conformity assessments procedures for particular value chains (Fulponi, 2005). These include the British Retail's Consortium's global food safety standard, the International Food Standard (IFS), the Dutch Hazard Analysis and Critical Control Point (HACCP), the Safe Quality Food (SQF) 2000 Level 2, and the ISO 22000:2005.

British Retail Consortium's (BRC) Global Food Safety Standard

The BRC standard was developed in 1998 to respond to the needs of UK retailers and brand manufacturers, however, the standard has gained popularity globally (e.g. in Europe and North America) and is recognised by the Global Food Safety Initiative (GFSI) (GFSI, 2007). The British Retail Consortium certification reassures retailers and branded manufacturers of the capability and competence of the supplier, and also confirms to other chain stakeholders that the minimum basic requirements for food safety have been complied with. Benefits include increased traceability and transparency in the global food value chain and the prospect of globally marketing food products.

International Food Standard (IFS)

The German and French retailer and wholesaler associations (namely Hauptverband des Deutschen Einzelhandels , Fédération des Entreprises du Commerce et de la Distribution) and their Italian counterparts, (COOP, CONAD, Federdistribuzione), have also drawn up common auditable standards, with the assistance of other international retailers. International Food Standard (IFS) is an international food safety standard that aims to create a consistent evaluation system for all enterprises supplying retailer branded food products, and is recognised by the GFSI. The standard provides a framework for uniformity in requirements, audit procedures and mutual acceptance of audits. IFS is suitable for enterprises processing food, and has been recognised by

committees among the three retailer and wholesaler associations in Germany, France and Italy. Other countries like the UK, Austria, Poland, Spain and Switzerland also recognise certifications to the standard as a demonstration of compliance to the basic minimum food safety requirements. Benefits of being certified to the standard include enhanced transparency and traceability along the food chain. Certification to IFS by an independent third-party also helps suppliers demonstrate to retailers that their product safety, quality and legal obligations are fulfilled.

Safe Quality Food (SQF)

The SQF Program is owned by the Food Marketing Institute (FMI). The standard combines both food safety and quality management certification for all chain participants involved in the production and processing of food, and is recognised by the GFSI. SQF comes in two separate standards: the SQF 1000 intended for primary producers and the SQF 2000, for all other participants (e.g. manufacturers, logistics) in the value chain. The SQF standard requires third party certification of a product, process, or food service and demonstrates that a food product complies with international, regulatory, and other specified standards.

Dutch HACCP

The Dutch HACCP was designed by the Dutch National Board of Experts to specify the requirements for HACCP-based food safety systems. The standard specifies the codes of practice within a management system framework and is particularly suitable for suppliers to the Dutch market.

ISO 22000 International Food Safety Standard

ISO 22000 is a global standard developed to harmonise on a global level, the requirements for food safety management, for businesses in the whole food value chain (ISO, 2005). The standard combines the following elements to ensure food safety in the global food value chain: interactive communication, system requirements, prerequisite programmes, and HACCP principles. The ISO 22000 standard and its complementary standard will be discussed further in later sections.

2.2.3.2 Similarities and Differences amongst Standards

Most of the standards discussed above are similar in the sense that they all have one main objective: to protect consumer health through integrated process-based food safety management, achieved through specifying the basic minimum requirements acceptable for food safety, and third party audits.

The private standards all have the Codex Alimentarius Commission's (CAC) HACCP principles as their foundation and some integrate quality management system requirements (Table 2-1) into the food safety standards (e.g. BRC, IFS, SQF). The Hazard Analysis and Critical Control Point (HACCP) technique was developed in the 1960s, through the collaborative efforts of the Pillsbury Corporation, the United States Army and the United States National Aeronautics and Space Administration (NASA) to ensure the production of safe food for the United States space programme (Khatri & Collins, 2007). NASA was looking for a food programme with the capability of guaranteeing a high degree of safe food for astronauts. Pillsbury therefore introduced and adopted HACCP as the system with an inherent capability to achieve a high degree of safe food. In 1993 the Codex Alimentarius Commission adopted the *Guidelines for the application of the HACCP system* and has incorporated it into the General Principles of Food Hygiene. Over the years HACCP has become globally accepted as a systematic and preventive risk analysis technique for anticipating food hazards and putting in place control measures to either mitigate their impact or eliminate them entirely.

The HACCP technique is made up of five preparatory procedures (Khatri & Collins, 2007): and seven main principles are employed to develop and operate HACCP (Unnevehr & Jenson, 1999; Khatri & Collins, 2007):

1. Assemble a HACCP team;
2. Define scope of HACCP study;
3. Describe product and intended use;
4. Prepare flow chart;
5. Verify control charts on site
6. Conduct hazard analysis;
7. Determine the critical control points (CCP);

8. Establish critical limits;
9. Establish a system to monitor the CCP;
10. Establish corrective action;
11. Establish documentation procedures;
12. Establish procedures for verifying that HACCP system is working as intended.

Effective implementation of these principles ensures that the food production process is developed on scientific basis, to address potential failures ahead of their occurrence.

The major differences amongst the standards are that they are owned by different stakeholders in different geographical regions, and while some seek to specify generic requirements that could be adapted to chain participants at different functional nodes in value chains, some are specific to either primary food producers or food processors.

Table 2-1: Key common requirement for food safety standards

FSMS Elements	BRC	HACCP	ISO 22000	SQF	Dutch HACCP	IFS
Management System	✓	✓	✓	✓	✓	✓
Pre-requisite Programmes	✓	✓	✓	✓	✓	✓
HACCP	✓	✓	✓	✓	✓	✓
Validation & Verification	✓	✓	✓	✓	✓	✓
Emergency preparedness/crisis management	✓		✓			
Quality Management	✓			✓	✓	✓

2.2.3.3 Attempts at Harmonising Food Safety Regulations

There are significant variations in food safety regulations across countries and among value chains. These variations increase the burden of auditing costs and certifications on food processors and manufacturers, as retailers require different certification frameworks to qualify or assess suppliers. The different private standards introduced by brand manufacturers and retailers further introduce more variations into food safety regulations and the modes of conformity assessments (Henson & Mitullah, 2004).

The impacts of these variations on relevant actors present practical reasons for the need for harmonising food safety regulations (Motarjemi et al., 2001). There are, however, justifiable reasons to explain these variations (Henson & Jaffee, 2006). Some are attributed to income levels and perceptions that influence the tolerance of populations towards the risk associated with food. Furthermore, the differences in climate, and the application of production and process technologies affect the incidence of particular food safety hazards. A common reference point was therefore required from where the process of harmonisation of standards could be started to reduce multiple certifications on food enterprises. The SPS Agreement introduced by the WTO facilitates a move towards this much needed common reference point, by providing a basis to establish equivalence and harmony in food safety regulations. According to Article 4, paragraph 1 of the SPS Agreement, Member States are to accept the measures of control employed by others as equivalent if the exporting country demonstrates to the importing country that its measure meets the importing country's appropriate level of health protection. As mentioned in earlier sections, harmony is further encouraged by the WTO through the endorsement of international standards as a measure of control for food safety. The WTO Agreement on Technical Barriers to Trade (TBT), which is binding on Member States, also includes as principles to foster harmonisation, the 'one-one-one' principle which implies, one standard, one test accepted everywhere, one conformity assessment mark where relevant (IEC, 2008).

In light of discussions above international standards clearly form a fundamental part of food safety harmonisation. The proliferation of global food safety standards necessitated a system to ensure that a global standard developed for one region and retailer was also valid for other regions and retailers. It is as a result of these issues that the Global Food Safety Initiative (GFSI) was introduced in 2000, to benchmark existing certification frameworks for food safety, to ensure convergence amongst food safety standards, and to maintain a benchmarking process for food safety management schemes. So far, thirteen GFSI benchmarked international standards for manufacturing, primary production and one for both primary and manufacturing have

been accepted by major retailers (Carrefour, Tesco, Metro, Migros, Ahold, Wal-Mart and Delhaize) (GFSI, 2007). The international standards recognised by the GFSI have successfully been aligned with the common criteria defined by food safety experts from the Food Business. This implies those retailers will accept any of the above mentioned GFSI certification schemes as proof of 'due diligence' in food safety procedures (GSFI, 2007).

2.2.3.4 Tougher Requirements for Laboratories and Third Party Auditing Bodies

The changing landscape of food safety has put increased pressure on laboratories used for analysing products for food safety and third party auditing bodies. There has been a trend toward '*accreditation'* of laboratories and third party auditing bodies – a process by which conformity assessment bodies are examined for independence, competence and skill, among other things (IEC, 2008). The 'accreditors', who usually receive their authority from government, use this process to assure confidence and mutual recognition of accreditations in the food value chains. Accreditation is seen as a way of guaranteeing analytical quality.

2.2.3.5 An Increased Role and Responsibility for Consumers

An effective and efficient control and management of food safety requires the concerted efforts of industry, government regulators, academia and consumers. Previously, a lot of emphasis was placed on what governments had to do to assure food safety. Recent developments recognise the role of consumers (Hanak et al., 2000) and the private sector as essential in assuring and managing food safety. The consumer's role in food safety is threefold: handling food in the appropriate manner before the point of consumption and using food for its intended purpose, and playing an advocacy and watchdog role in the regulatory process. Through the third role consumers provide information to regulators on the safety and wholesomeness of food products in use.

2.2.4 Impact of Food Safety Requirements on Developing Countries

With diminishing barriers to international trade, concerns of major stakeholders have now shifted to how to ensure that food produced for local consumption and export at the different nodes in global value chains (GVCs) is safe. However, it is generally believed that a number of developing countries and development agencies which aim to promote trade as a means of economic development and poverty alleviation are concerned that there exists the potential for non-tariff barriers to be used to limit the ability of developing countries to exploit high-value markets in developed countries and enhance their competitiveness (Henson & Jaffee, 2006; Henson and Jaffee, 2008). The established view is that food safety regulation is used as a protectionist tool (Henson & Jaffee, 2006), for either prohibiting imports of food products or discriminating against imports through the application of more stringent enforced regulatory standards than on domestic suppliers (Henson & Jaffee, 2008). Even under circumstances where food safety regulation is not intentionally being used to discriminate against imports there are concerns that their growing complexity, proliferation and the lack of harmonisation between countries impedes the efforts of developing countries to gain access to value chains with potentially higher returns in developed countries.

An alternative and less pessimistic view on the impact of evolving food safety regulation on developing countries exists, where some researchers (Jaffee & Henson, 2004a & b; World Bank, 2005) suggest that there are opportunities that developing countries can utilise to competitively reposition their industries. This perspective suggests that public and private standards are a necessary bridge between increasingly demanding consumer requirements and the participation of international suppliers. Also associated with this perspective is the notion that the cost of complying with international food safety requirements may motivate modernisation of export value chains, thus inducing innovation at the enterprise level (Porter & van de Linde, 1995). Further, it is also believed that the evolving, more stringent food safety standards can stimulate capability-building within the public sector and give greater clarity to appropriate management functions of government (Henson & Jaffee, 2008). There is

also the potential for spillover of 'codes of good practice' into domestic food safety systems. Even though this perspective accepts that not all participants will gain, it does suggest that the process of compliance can provide the basis for more sustainable and lucrative food exports in the long term. Regardless of the compliance costs associated with these more stringent measures it is argued that the returns in terms of continued and/or expanded access to high value-added markets can more than compensate for those costs (Henson & Jaffee, 2008).

2.2.5 Challenges Faced by Developing Countries

As demonstrated in the previous section, participation in the GFMVC presents potentially lucrative opportunities for developing countries to enhance their trade performance, economic status, reduce poverty and instabilities in their economies, due to fluctuations in raw commodity prices. The evolving demands placed on them by standard requirements have the potential to reduce the prospects for market access (Henson & Jaffee, 2006).

It is believed that the existence of other major concerns in relation to lack of food security, political instability, communicable diseases, and eradication of poverty dominate government's agendas and hence food safety remains a low priority (FAO/WHO, 2005a). However, a crucial element to providing a solution to a significant amount of these other concerns is the appreciation of public health, and the economic and social benefits enhanced food safety systems can provide, if handled effectively.

An explicit but crude indicator of the ongoing difficulties faced by developing country exporters in meeting food safety requirements of the international market is the number of border rejections and market notifications (Henson & Jaffee, 2008). The Rapid Alert System for Food and Feed (RASFF) is one system that captures this kind of information. It was implemented by the EC, for its Member States, with the primary aim of providing food and feed control authorities with an effective tool through which to exchange information about measures taken in response to risks detected in relation to food and feed (European Commission, 2010). This was to facilitate a rapid and more coordinated response of Member States to a health threat, relevant to food

and feed. Two major types of notifications are differentiated in the system: ***border rejections*** and ***market notifications*** (European Commission, 2010). Market notifications are health risks identified in products that are placed on the market in the notifying country. Information on the product relevant to the risk identified, traceability and measures taken are notified to the Commission. Market notifications are further classified into ***alert notifications*** and ***information notifications.*** Alert notifications are sent when a food presenting a serious risk is on the market or when rapid action is required, and the information notification concerns a food on the market of the notifying country for which a risk has been identified that does not require rapid action.

The second category of notifications is border rejection. This concerns food that has been refused entry into the Community for reasons of health risk. From Table 2-2, it is realised that since 1997, the number of total notifications has been increasing (exceptions apply to the years 2006 & 2007), even though global regulations are also growing across countries.

This could reflect the fact that awareness has increased and more, as well as better controls for detecting food hazards have been implemented, or a continued difficulty in producing countries to comply with the requirements of the international market.

From the total number of notifications in Table 2-2, a significant amount of the notifications falling into the border rejections and information notifications were from third countries[11] (approximately 75%) (European Commission, 2010). A further analysis of the notifications by country of origin of product revealed that on the average, approximately 80% of products that were affected were from developing countries.

Analysing notifications by regions reveals that a significant amount of the notifications by country of origin of product is Asia, with the smallest coming from the Oceana region (Figure 2-7). The trend depicted in Figure 2-7 continues to exist even in 2009 (European Commission, 2010).

[11] Third countries are countries that do not belong to the European Union. The term is often used when referring to relations between EU Member States and a non-EU Member State.

Table 2-2: Notifications through RASFF

Year	Total Notifications	Market Notifications		Border Rejections
		Alert Notifications	Information Notification	
2009	3204	557	1191	1456
2008	3043	528	1138	1377
2007	2924	952	761	1211
2006	2871	910	687	1274
2005	3155	955	747	1453
2004	2581	690	553	1338
2003	2310	454	1856	NA
2002	1526	434	1092	NA
2001	708	302	406	NA
2000	473	133	340	NA
1999	360	97	263	NA
1998	230	74	156	NA
1997	81	67	14	NA

Source: European Commission, 2006; 2008; 2009

Table 2-3: Classification by developing vs. developed countries in 2008*

Category	2008	%	2007	%	2006	%
Developing Country	105	75.5	110	81.5	98	82
Developed Country	34	24.5	25	18.5	21	18

*Data for 2009 and 2010 are not readily available

Source: European Commission, 2005; 2007; 2009

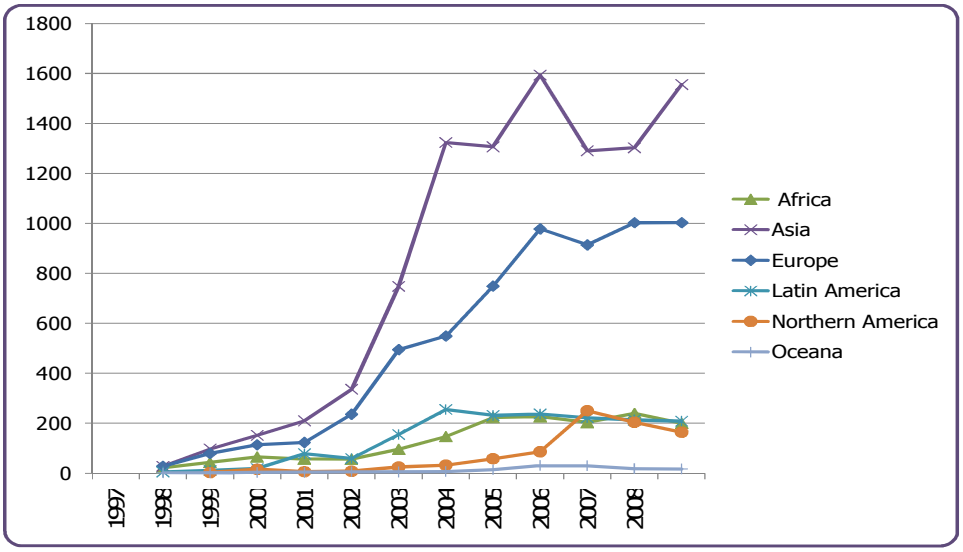


Figure 2-7: Notifications by region 1997-2008

The ultimate risk faced by exporters is that their consignments will be rejected at the borders of importing countries. Implicated products will be destroyed. The consequence for bringing implicated products to domestic markets or diverting them to alternative markets, where food safety requirements may be less stringent, is additional transport costs. For products destroyed, even more costs are incurred.

The country of origin of the implicated product also stands the risk of either a partial ban or total ban, and may in the future be subjected to strict scrutiny (Henson & Mitullah, 2004). A demonstration of potential action taken to protect public health and safety is demonstrated in the sunflower oil originating from Ukraine and melamine in infant milk from China (European Commission, 2009). Given the notification through the RASFF, the European Food Safety Authority (EFSA) issued a scientific statement in response to the potential risk posed by the high levels of mineral oil present in sunflower oil from Ukraine, suggesting that even though the identified food safety hazard was undesirable for human consumption, there was no imminent risk; however, since the source of the risk has not been identified with certainty, there is the presumption of risk attached. Member States responded by withdrawing implicated products from the market. The Ukrainian authorities were repeatedly encouraged to provide information on traceability and on future control measures. Because the Ukrainian authorities failed to guarantee that systems will be upgraded to effectively control exports of the food product in question, a temporary ban was placed on imports of sunflower oil from Ukraine, pending the availability of an effective control system. The temporary ban on Ukrainian sunflower was lifted after actions were taken to enhance conditions for the acceptance of an effective control system. In the case of the presence of melamine in milk from China, an alert through the RASFF indicated adverse consequences to the degree of death of six children, and more than 200 000 infants and children affected with kidney problems in China. The result was the establishment of special conditions governing the imports of food and feed originating or consigned from China. Specifically, composite products containing milk ingredients intended for infants and young children were prohibited, physical control (sampling and analysis) for the presence of melamine in all consignments of

composite products containing milk products were performed through designated control points. Additionally, an increased control in the presence of melamine in other food products with high protein content was also implemented, and a destruction of all non-compliant food. The prohibitions placed on milk products and composite milk products containing milk ingredients from China were extended to other products like soybean meal and ammonium bicarbonate because of melamine risks.

These notifications are as a result of food control systems that are not effective and hence are not able to provide the necessary assurance for public health and safety. The sources of risks may be as a result of the lack of appropriate systems relevant to administrative, technical and scientific capacities to comply with specified requirements (Henson et al, 2000). The food safety assurance systems in most developing countries demonstrate significant gaps that lead to such system failures (FAO/WHO, 2005a). For many countries, there are significant gaps in the legislative and institutional frameworks currently being used to assure food safety. Domestic regulations either lack a clear mandate and authority to prevent food safety problems or are fragmented, inadequate and duplicated in various legislative instruments. This leads to confusion among regulatory agencies, concerning who has control over which jurisdiction (FAO/WHO, 2005a). This translates into ineffective enforcements and monitoring, and inefficient use of scarce resources, (FAO/WHO, 2005a). There are also infrastructural gaps: food control laboratories are inadequate, inappropriate, and not accredited, and these have various implications for the compliance of food manufacturing enterprises.

2.3 Chapter Summary

In summary, the potential options open to, and hindrances faced by developing country enterprises to access the global food manufacturing economy is influenced by the inter-governmental governance mechanisms that exist at the global, regional and bilateral level, governance patterns specific to GVCs (market-based, hierarchical, quasi-hierarchical, and network-based), including global policy networks, the core competence of lead enterprises, and the capability of domestic enterprises to

consistently produce high quality, safe food. Accordingly, domestic enterprises and the countries in which they are hosted are expected to demonstrate their commitment to, and compliance with international food safety requirement to access GVCs. This provides a means through which enterprises can qualify for orders, however, actual participation is dependent on other competitive dimension – e.g. price, quality, reliability

CHAPTER 3: FOOD SAFETY ASSURANCE IN THE GLOBAL FOOD MANUFACTURING VALUE CHAIN (GFMVC)

This chapter explores the extant literature to investigate how food safety is assured in GVCs, particularly looking at the regulatory, institutional and policy frameworks and how they are made operational in practice. The chapter first discusses the nature of food safety failures to understand how they might occur, and the strategic nature of food safety issues. It further discusses the elements of food safety capability, and looks at the issues relevant to the compliance of enterprises, concluding with an overview of current issues in food safety.

3.1 The Nature of Food Safety Failures

The keenness exhibited by governments and international organisations in relation to food safety issues is necessary, because food system failures have significant adverse consequences on a variety of aspects of a country. There is the possibility for negative impacts on food security[12], human lives, cost for providing health care, markets (markets will be disrupted), as well as increased costs to industry (Henson and Hooker, 2001; Salin and Hooker, 2001; Hennessy et al, 2003) and government. There is also the tendency for civil society to lose confidence in the capability of existing government and institutional frameworks to successfully govern a country. This reflects the fact that even though compliance with food safety requirements may be costly, the costs of non-compliance would probably be colossal.

The nature of food safety failures can be described by a concept known as systemic risk (Hennessey et al. 2003; Fares & Rouviere, 2010). It is the risk experienced when a system fails to perform; and can be attributed to the manner in which its various components interact. Understanding the potential sources of the risks is essential if the failure and the magnitude of the losses originating from the system's breakdown are to be effectively managed (Hennessey et al. 2003; Fairman & Yapp, 2004).

[12] Food security is when all people at all times have access to sufficient, safe, nutritious food to maintain a healthy and active life (FAO, 1996).

According to Hennessey et al. (2003), systemic risk has four root sources in food systems:

- **System structure:** this relates to the dependencies in the production system. The risk arises from the ways in which the system components (raw material suppliers, processors, manufacturers, distributors, retailers and the final consumer) interconnect. The food product and information on the product changes hands or ownership frequently from one state to the other, and so it is often difficult to guarantee its quality and safety at the point of consumption. The structure of the chain is such that if one actor compromises the safety of the food at any point, the whole value chain system could potentially be compromised.
- **Mistrust in communication**: this arises when downstream actors in value chains mistrust the information delivered to them by upstream actors and, have little or no confidence in the competence of the regulatory process to ensure safe food. This risk arises because consumers have the notion that chain actors with pertinent information to the status of food also have the incentive to either conceal or mislead. The effects of this lack of trust on the food safety system are potentially unnecessary consumer panics which result in market disruptions. The source of this risk is rooted in incentive problems – the lack of it or the inappropriate design or application of it.
- **Asymmetric information:** this happens when information about the characteristics of food is not sufficiently communicated to actors across the value chain, arising because the states of nature and characteristics of the food products have the tendency to vary across the chain. As a result, some actors will be less informed about the actions of other actors and how it has impacted on the safety of food. As enterprises have the tendency to take optimal actions, given the profit functions they face, there may be the possibility that some enterprises take insufficient action or care of food when it passes through their production or processing systems. The presumption of one enterprise that the other is not taking due care of the products may influence

the degree of care taken on their part to ensure the safety of products, which may not reach the consumer in its best safety status.

- **Failure to develop state conditioned technologies**. This type of risk arises from the gaps in the number of states of nature and the number of states that available technology can deal with. Two states of nature are used here: random and deterministic. In the first instance, where condition of states of nature is random, a trade-off may exist between: (a) buying into a narrow technological solution that is not able to deal with all states of nature; and (b) investing into a more costly technology or system with the potential to deal with all states of nature. The element of randomness introduces a technical diversity that makes it difficult to effectively deal with future failures using a narrow technology or system.

  In the latter, where states of nature are deterministic, but not constant, a single decision variable affecting food safety may not adapt well to available states of nature. A decision to upgrade available technologies or systems to adequately deal with all states of nature might require prohibitive financial investments.

The complexities and randomness associated with food safety systems therefore introduce significant challenges regarding what control systems to implement, and how to implement them (across all industry or to a select few), given constraints on resources.

3.2 Food Safety as a Strategic Issue

Available empirical evidence suggests that some exporters have been denied access and excluded from potentially lucrative export markets (Henson & Mitullah, 2004; Henson & Jaffee, 2008; European Commission, 2008), and for those already participating in export-oriented value chains, their survival is continually being threatened because of weak food safety capability within domestic contexts (Henson & Jaffee, 2006: 2008).

The fundamental issue here is that even though food safety regulations have the tendency to impede international trade, the measures adopted by most countries are legitimate and fall within the prescriptions of multilateral trade rules and guidelines. For the cases which may be illegitimate, procedures have been laid down to settle such irregularities. The point where developing countries have the greatest opportunity to influence international trade significantly is at the negotiation and drafting stages of agreements and standards; after signing such trade instruments and agreeing on the content of standards, requirements are binding, regardless of whether they have the capability to comply or not. Consequently, the prospects of developing countries accessing high value markets lies in developing and sustaining food safety capability (Henson & Jaffee, 2006).

Effective food safety management is a vital component to competitive repositioning and therefore is often addressed at a strategic level (Henson & Jaffee, 2006). The strategic options open to policy makers and enterprises in relation to managing the risks and opportunities associated with food safety are numerous (Jaffee, & Henson, 2004a; Henson & Jaffee, 2005: 2006). Given the sources of systemic risks (Hennessey et al., 2003) in the food system, the different states of hazards associated with food, and the costly investments involved in finding appropriate means of controlling system failures (Hennessey et al., 2006; Henson & Jaffee, 2006), trade-offs are often made between available alternatives of compliance and managing the chosen processes of capability building and adjustments to ensure sustainability. This is particularly true for developing countries with limited resources.

The strategic responses available for food safety regulation is developed around the concepts of '*exit', 'loyalty'*, and '*voice'* (Henson & Jaffe, 2008) on one dimension and *'proactivity'* and 'reactivity' on the other dimension (Table 3-1).

'Exit' is context specific and could involve emigrating or ceasing to import from a particular country or enterprise and leaving a particular sector or enterprise. 'Voice' involves protest or otherwise lobbying for changes in rules and laws, and 'loyalty' is deepening one's participation in, and alignment with, an entity's goals and processes. In any one industry, a combination of the three strategies is likely to be observed.

Table 3-1: Strategic response to food safety regulation

	Reactive	Proactive
Exit	Wait for standards and give up	Anticipate standards, leave particular markets or market segments, and make other commercial shifts
Loyalty	Wait for standard and then adopt measures to comply	Anticipate standards and comply ahead of time
Voice	Complain when existing standards are applied or new measures are being adopted	Participate in standards creation and/or negotiate before standards are applied

(Source: Henson and Jaffee, 2008)

Developed and developing countries differ in their response to issues of food safety, with regards to setting the pace with food safety regulations and proactively addressing food safety concerns. Developing countries are generally 'standards takers', (Henson & Jaffee, 2008). The usual strategic option is either to strictly comply with specific product and/or process requirements, or implement food safety systems that meet specified functional and/or performance criteria (loyalty). This approach to compliance may be implemented in response to regulations coming into force (reactively) or in anticipation of future trends in the evolution of food safety regulation (proactively). However, the former is often true. The recommended approach to produce optimal returns in terms of greater scope for the management of compliance, in a manner that brings about strategic and economic gain is the 'proactive' approach (Henson & Jaffee, 2006). This is because it provides greater scope to test and apply alternative technologies, and employ varied administrative and institutional arrangements.

The practical perspective of food safety as a strategic issue, however, offers more strategic options for both developed and developing countries. There is also the option for countries and their exporters to exit e.g. export markets, specific value chains and

products, switch customers, with the hope of entering new export markets, servicing new customers and manufacturing new products for which the food safety requirements are not onerous. The anticipation of a loss of competitiveness, negative economic or social impacts motivates this strategic choice.

Accordingly, the prospects of more profitable alternative markets can also influence this decision. A third option open to enterprises and their host countries is to exercise their 'voice'. This option allows governments and their enterprises to seek to influence the prevailing rules or respond to new standards by negotiating or complaining, and is a critical element to food safety diplomacy (Henson & Jaffee, 2006).

By virtue of developing countries signing up as Member States of international organisations e.g. the World Trade Organisations (WTO), International Standards Organisations (ISO), they are required to exercise or exhibit their 'voice' during the process of formulation of frameworks for guiding international trade. Even though hard data is not available to demonstrate the degree of participation or objections raised through proactive 'voice', available literature (WTO, 2008) suggests that when decision making is not reached by consensus in the WTO, each Member State is entitled to vote on the issue (one vote per country). This is apparently, a medium through which developing countries can exhibit voice in the formulation of agreements and rules that have an impact on how international trade is governed. Since developing countries make up approximately 72% of the Members of the WTO, the impact of their voice or vote on issues should be significant, through decisions on trade arrived at through voting. Other opportunities for exhibiting voice exist through provisions made by the Sanitary and Pytosanitary (SPS) and Technical Barriers to Trade (TBT) Agreement, for complaints and counter notifications. Both the TBT Agreement (article, 2, sub-section 2.9.1) and the SPS Agreement (Annex B, section 5, sub-section 2.9.2), make provisions for Member States to keep each other informed about changes to their regulation (that may have significant effects on trade), its scope, objective and rationale. In the event that any Member has reason to believe that another Member is in breach of this requirement, they may raise the matter with the Member State concerned, with the aim of resolving it satisfactorily. If satisfaction is not achieved,

they may then make a counter-notification to the Council for trade in Goods, for consideration by the working party, simultaneously informing the Member concerned. Available data (Henson & Jaffee, 2008) indicates that a number of such complaints have been received by the WTO, which contains some complaints by developing countries. This is indicative of developing countries exhibiting 'reactive voice', even though the complaints have been dominated by a small number of developing countries, particularly, Argentina, Brazil, Chile and Thailand (Henson & Jaffee, 2008). The question then arises as to what the impact of evolving food safety requirements has been on the remaining developing countries that have not as yet exercised voice. There is the temptation to look at the silence exhibited in two ways: that those developing countries are satisfied with the requirements and hence are complying or at least are making an attempt to comply; or a demonstration of the lack of capability to either exercise their 'voice' in these matters of international trade in food through negotiations. Literature was however, not available to verify these possible outcomes.

In the context of the private sector, a growing number of food safety regulations have also been enacted that fall outside the jurisdiction of the WTO. Developing countries have and are participating in international standards setting organisations in the area of food safety, in particular, ISO (Table 3-2). However, the scope of exhibiting voice still remains limited, even though they make up a significant percentage of the organisation.

Table 3-2: Breakdown of membership of ISO as of 2004

ISO members from developing countries as of 2004					
Member Bodies		Correspondent Member		Subscriber Member	
Developing Country	Developed Country	Developing Country	Developed Country	Developing Country	Developed Country
Total No. is 100		Total no. is 35		Total no. is 11	
65%	35	94	6	100	0

(Source: ISO, 2010)

In relation to the ISO, developing countries have the opportunity to exhibit voice by becoming full participant members. Without full participant member status, developing countries will not be entitled to participate and exercise full voting rights

on all matters (ISO, 2010). Other member statuses exist: observer or liaison member. An observing member will be informed of the work of the committee but has no obligation to vote. The best opportunity to influence ISO's technical work is offered by direct participation in technical committees, sub-committees and working groups. As a member of a committee, participants can input the views of national stakeholders they represent and can propose new projects.

It is not expected that countries participate actively in all ISO committees on all subjects, and hence developing countries select those projects they wish to participate in. The choice often depends on whether there is significant national interest for the product, either for domestic use or export purposes. An additional criterion would be availability of domestic capability to present the country's position on the chosen field, and local technical expertise to ensure meaningful and constructive contribution at the working group level. In spite of the significant share of developing countries in the membership of ISO, they currently hold only approximately 5% of all ISO Technical Committee and Sub-committee secretariats, and their delegates and experts often have difficulties in attending committee and working group meetings.

In the context of the forgoing discussion on the framework, combining 'exit', 'loyalty' and 'voice' on one dimension and 'reactivity' and 'proactively' on the other, the potentially advantageous strategy combines 'voice' and 'proactivity'. According to Henson & Jaffee (2006: 2008), this approach is most likely to turn the challenges associated with evolving food safety standards into a competitive opportunity and yield positive competitive gains. Conversely, the weakest approach is a combination of exit and reactivity.

The strategic choices discussed above are not available to any one country, sector or enterprise within that country. Choices made within the prevailing constraints in the strategic environment will differ over time, across issues, and will, for example reflect the prevailing cultures, attitudes towards regulation and levels of risk adversity.

3.3 Food Safety Capability

Food safety issues are addressed within a system for food safety assurance, and this system is made up of different elements (Berg, 2000; Henson & Jaffee, 2006; FAO, 2006) that work together to define the food safety capability of a country. This capability influences the nature and extent of the response of countries to new and stringent food safety requirements characterising the global food manufacturing value chain (GFMVC).

Food safety capability building

"*is defined as the process through which relevant stakeholders from farm to table (including government agencies, food enterprises and consumers) improve their abilities to perform their core roles and responsibilities, solve problems, define and achieve objectives, understand and address needs, and effectively work together in order to ensure the safety and quality of food for domestic consumption and export.*"

(FAO, 2006)

It involves a collection of both basic and more advanced technical and administrative structures, supported by skilled human resources, financial and information resources and physical infrastructure, (World Bank, 2005), as well as a system for sustaining these capabilities in the long term.

These requirements have been clustered into different levels as depicted in Figure 3-1: the system/context in which organisations, groups and individuals operate; the organisations and groups within the system; and individuals within organisations and groups (FAO, 2006; Henson & Jaffee, 2006). The different levels are closely related and different levels of capability exist at each of these levels.

Food safety systems have as part of their constituents, laws, regulations and policies that provide the guiding framework for ensuring safe food (Berg, 2000; FAO/WHO, 2003; FAO, 2006; Henson & Jaffee, 2006). These are complemented with strategies and processes for responding to food safety issues. The organisational level dimensions concern, among other things, the institutional structure, operational procedures and values (Berg, 2000) guiding organisations involved in food safety

assurance. Human, financial and information resources, and infrastructure also play a prominent role.

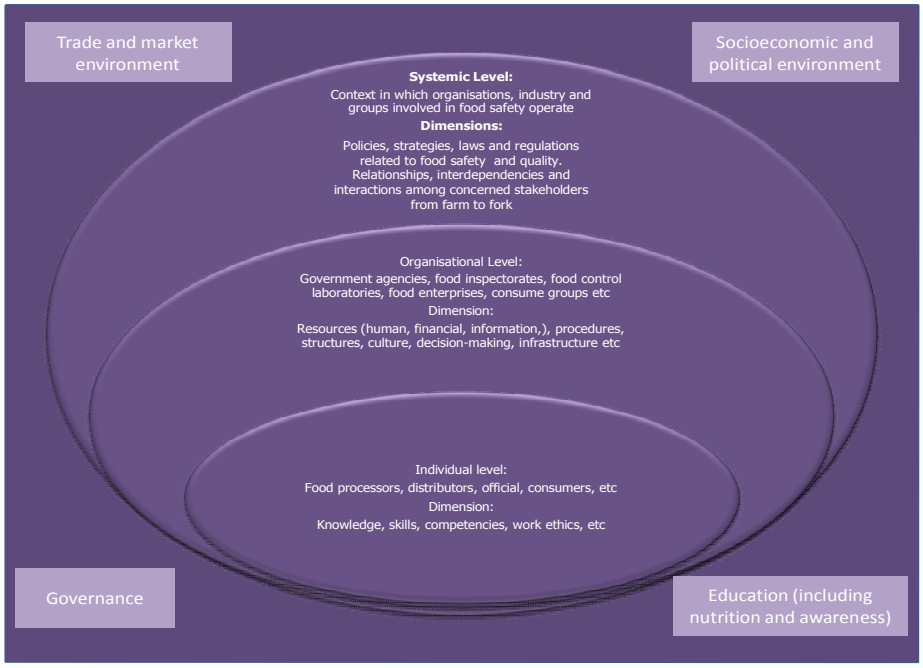


Figure 3-1: Levels and dimensions of food safety capability

(Source: FAO, 2006)

At the individual level, knowledge and recognition of food safety by all concerned stakeholders is an essential element of effective food safety capability. The effectiveness of the first two levels is partly dependent on this element (Henson & Jaffee, 2006). This will require an appreciation of major food safety challenges amongst the different stakeholders, including: public sector officials (including government and regulators) so that they can effectively prioritise and allocate funds accordingly; industry (including officials of sector associations and food manufacturing enterprises) so that they can make appropriate investment decisions at the enterprise level (Henson & Jaffee, 2006). Adequate skills, competencies, experience and ethics are also important elements of this category.

These three levels form the central elements of food safety capability; and clustering the different elements into these levels facilitates the identification of the root causes of weak food safety capability at different levels (FAO, 2006). The associated investments in terms of human, infrastructural and financial resources to implement

and sustain such a system can be significant (Hennessy et al, 2003; Henson & Jaffee, 2006). In practice, however, many countries often have some elements of food safety capability in place, and hence reforms are often targeted at upgrades of different elements.

In the past, capability development initiatives concentrated on improving the capacities of individual elements, and focused primarily on training, providing funding and/or equipment to enable individual staff members to increase their knowledge and skills to contribute to an enhanced capacity and performance of relevant organisations. Over time it became clear that training without providing suitable conditions within the organisation to enable trained individuals to apply their acquired skills and competencies lessoned the impact of training in organisations. This insight hence inspired new thinking about capability development, in that consideration is now given to the overall system or environment in which individuals and organisations operate and interact (FAO, 2006).

3.3.1 Will Regulation Solve Food Safety System Failures?

The primary objective of most food safety systems are to protect public health and safety, contribute to economic development by maintaining consumer confidence in the food system, and provide a sound foundation for domestic and international trade in food (FAO/WHO, 2003; Hutter, et al., 2008). The inability of the food safety system to achieve these objectives on its own is an indication that markets are not functioning in the way they should (hence the existence of market failure). Consequently, policy makers are resorting to regulation to address food safety system failures. However, it is increasingly recognised that the existence of market failure does not necessarily mean that government legislation (or even private sector regulation) can necessarily improve upon food safety systems, particularly when consideration is given to the positive role that market mechanisms, for example product quality reputation, play in the provision of safe food (Antle, 1999). Furthermore, even when some form of regulation can positively impact on the net benefits, available evidence in the field of environmental regulation and even in food safety regulation suggest that the impacts

can significantly depend on how regulatory systems are designed (Stern, 1997; Antle, 1999; Ehrhardt et al., 2007).

Some policy makers are strongly advocating for regulators to reconsider the measures available to achieve their regulatory objectives, and are proposing options that leave decisions to businesses, as opposed to prescribing the ways in which they should behave.

From the extant literature, not all food safety challenges can be solved by implementing one mechanism; a variety of hybrid mechanisms may prove more effective in different contexts. In some circumstances, the implementation of mechanisms that foster infrastructural developments or even policy reforms that facilitate competence development may enhance compliance. In other contexts, providing resource incentives to direct actors may be the solution. According to the BRTF (2003), regulatory interventions can be necessary, however, generally, they should be used only as a last resort, and only if it can be shown that it is more likely to be effective than other measures. However, regulation has proven very popular in both developed and developing country contexts (Loader and Hobbs, 1999, Henson & Jaffee, 2008), where it is used to address food safety system failures, (BRTF, 2003; Australian Government, 2007). This is because of the nature of food (it qualifies both as experience and post-experience goods (Weimer & Vinning, 1992)), the inability of chain actors to guarantee its safety at the point of consumption due to information asymmetry and the irreversible consequences that could potentially be associated with food safety system failures. Furthermore, chain actors have the tendency to be profit driven at the expense of producing safe food (Hennessey et al, 2003). Some enterprises may genuinely not have the necessary competence and resources to produce safe food, however, because of the resource intensiveness of required systems, and the need to continually invest and improve the system, even with support, some enterprises might not put in place the necessary protocols to ensure safe food. As a result, governments (and the private sector) feel the need and the political obligation to step in to mitigate and if possible eliminate the potential

devastating effects of food safety system failures and protect consumer health and safety.

Other than the need to safeguard consumers, there are economic and political drivers for food safety regulation as well. As discussed in section 2.2.2, access to the GFMVC is no longer driven by price and quality grades; instead, compliance with food safety requirements has become a 'ticket' for accessing and participating (Jaffee & Henson, 2004a). Furthermore, without sufficiently demonstrating to the international community the commitment of governments and their industries to food safety (using the different elements of capability depicted in Figure 3-1), and developing a reputation through this demonstration, there may be economic consequences to countries that are found not to be committed to public health and safety. This may impact on the competitive position of the domestic sector on the global market. The cost impact of food safety system failures on industry and government in terms of product recalls, liability and health care services is significant and even in some cases some of these consequences (e.g. death) are irreversible. Furthermore, indirect consequences are felt in other areas e.g. worker productivity, food security as mentioned in section 3.1. Politically, consumers may lose confidence in the ability of regulators or government to effectively govern the food safety system and the country as a whole; this has implications for markets and how civil society exercises their voting rights.

Food safety regulation has been implemented in the UK, the US, Canada, Australia (Loader & Hobbs, 1999), Ghana, Nigeria and many more countries, for many years now; however, one cannot definitely say that the incidence and prevalence of food borne illness and deaths have abated. In the US for instance, it is estimated by the Centre for Disease Control and Prevention that each year about 76 billion people are infected with food borne illness, that 5000 people die from food borne diseases. The effects of these occurrences amount to an estimated $ 152 billion dollars (IBM, 2010). Also in Canada, the Health Canada and Public Health Agency estimate that every year 11 – 13 million Canadians suffer from food borne illness, and the annual related costs of these illnesses and deaths is 12–14 billion. Similar statistics are recorded in

Australia, where it is estimated that 5.4 million cases of food borne diseases occur annually, costing an estimated $ 1.2 billion dollars. These statistics reflect the need for a continual review and update of food safety assurance systems, as the factors that work together to cause food safety system failures (technology, hazards, and processes) continually evolve. Furthermore, the figures are indicative of the fact that regulating food safety for the sake of regulating a sector is not sufficient to guarantee that food produced is safe. Examining the individual countries reveals differences in designs, the strength of enforcements or the mandatory threat, which is an essential element to be considered in the decision of enterprises to comply with food safety requirements or not. Furthermore, the implementation of food safety regulation has facilitated the withdrawal/recall of food products found to be contaminated, thereby serving as a preventative approach to the potentially huge scale of adverse consequences associated with food safety system failures.

While many countries (both developing and developed) have resorted to public legislation to address food safety system failures, the question still lingering on in the minds of some researchers (and indeed policy makers) is whether implementation of statutory food safety regulation is the only viable option to achieve the primary objectives of food safety assurance systems, or are there other alternative mechanisms which can achieve this same objective?

Table 3-3: Alternative mechanism to regulation

Alternative forms of Regulation	Description
No intervention	No specific action is taken to improve prevailing situation
Information and education campaigns	Strategies aim to alleviate the problem by making available quality information relevant to the situation
Incentives or market-based instruments	These allow individuals to make their own cost-benefit trade-offs in pursuing certain behaviour

(Source: BRTF, 2003; Australian Government, 2007)

Furthermore, are mandatory controls necessary, since some enterprises out of their own volition are implementing voluntary integrated systems (Caswell & Henson, 1997), and would reliance on voluntary measures provide adequate consumer protection

(Segerson, 1999). Table 3-3 gives an overview of alternative mechanism to regulation captured in literature.

In order to answer these questions, an understanding of the mechanisms that have been applied and their context is needed. Also, it is pertinent that an examination of the responses of various stakeholders to these mechanisms be done because this will provide insight into which mechanisms work effectively and why. Sections 3.3.2 to 3.3.2.2 will address these issues raised.

3.3.2 Food Laws and Regulations

A range of mechanisms for food safety assurance have emerged over the years: the most popular one being command and control (also known as statutory or classic regulation). There are a richer range of other regulatory structures (Sinclair, 1997; BRTF, 2003) that policy makers can rely on to address food safety issues. Table 3-4 gives an overview of the forms of regulation.

Table 3-4: Forms of regulation

Forms of Regulation	Description
Self-regulation	Rules, standards and codes of conduct are formulated and enforced by industry.
Quasi-regulation	Rules, standards and codes of conduct are formulated by government and enforced by industry; however the requirements specified by government may not be legally binding.
Co-regulation	Industry develops rules, standards and codes of conduct and administers its own arrangements, but with legal backing from government to enable enforcements.
Statutory (classic) regulation	Rules and codes of conduct are prescribed and administered by, or on behalf of government.

(Sources: BRTF, 2003; Australian Government, 2007)

The growing complexities in food safety challenges make it necessary that policy makers have at their disposal a wide variety of mechanisms that when combined, and manipulated, can better suit particular circumstances, the unique characteristics of the regulations, and the contextual differences that arise (Sinclair, 1997). As there are no right or wrong choices to these mechanisms, it is necessary to learn from the practical experiences of countries in relation to the application of the plethora of alternative

mechanisms available and tailoring these mechanisms to suit particular circumstances (FAO/WHO, 2003; Ehrhardt et al., 2007).

Effective regulation is regulation that is designed to address the objective for which it was enacted (Antle, 1999; Ehrhardt et al., 2007). Regulators need to understand the market structure, the linkages that exist, the potential external power and influences (Berg, 2000; Laws et al., 2003) from stakeholders or even parties that are external to the chain, and the potential effects of mechanisms on stakeholders under different conditions – information asymmetry, varying incomes, and limited resources. It is also essential that regulators have knowledge of the administrative capability available to both industry and government to facilitate the making of trade-offs with regards to appropriate mechanisms.

3.3.2.1 Statutory vs. Private Food Safety Regulation

Relatively clear distinctions have been made in the traditional sense concerning who takes responsibility for certain specific domains for food safety management, although such demarcations are increasingly challenged (Henson & Jaffee, 2006). Technical regulations, which are supposed to be mandatory, have been deemed conventionally the responsibility of government or public institutions. Self-regulation, which is also conventionally the role of the private sector (industry), is playing an increasing role in food safety governance. In principle, measures can be taken by either the public or private sector (or even a partnership approach); particularly under circumstances where the needed administrative capability and investments to upgrade the industry to comply with enacted regulation cannot be generated by either government or the private sector on its own. In public regulation, government commands industry to meet certain specific requirements, either through legislation or indirectly through delegated authority, and controls its behaviour through liability law. As per law, there is little or no room for enterprises to avoid their regulatory obligations. However, some schools of thought argue that regulators require a great deal of information and support in order to carry out their regulatory functions (Grajzl & Baniak, 2009), of which industry is the source. This raises the concern that public regulation may be

liable to negative influences from industry and the more economically powerful, who may attempt to lobby government or pursue their own interest rather than that of the public (Sinclair, 1997; Baldwin & Cave, 1999; Grajzl& Baniak, 2009). This gives enterprises leverage over regulatory procedures and objectives and may render public regulation ineffective.

Private regulation (self-regulation) is often a favoured option over public regulation, and is touted as a means for overcoming the pitfalls of public regulation. In particular, where public law enforcement authorities may be vulnerable to subversion (a variety of tactics relying on lobbying, bribery and intimidation of adjudicators) self-regulation is a feasible alternative, despite the possibility of industry self-serving actions (Grajzl & Baniak, 2009).

Self-regulation relies significantly on the goodwill and cooperation of individual enterprises for their compliance. The approach places emphasis on gaining a moral commitment from chain actors and upon using information, education, technology sharing, and peer group pressure as a means to achieve compliance (Sinclair, 1997). It is not characterised by strong enforcement provisions, and it is often argued that this is the fundamental reason why it is an attractive alternative. According to Braithwaite (1993), industry's aversion to government intervention is enough to overcome any reservation at assuming high costs associated with self-regulation. The advantages may include a high level of commitment of industry to their own rules and there is usually a close fit between rules and the standards that enterprises accept as being possible to attain. Nevertheless, private regulation (self-regulation) is also not without disadvantages, even though its advantages are often its selling point. Some of the downsides are that the costs to industry could be significant, rules may be self-serving and the public may require government to take responsibility for governing the particular sector (Baldwin & Cave, 1999).

Against this backdrop, Ayres and Braithwaite (1992) suggest that it is better to think about regulation in terms of a pyramid, in which private regulation is favoured as the initial response to crisis, however, when the desired results are not achieved, enforced private regulation (co-regulation) will introduce greater state oversight. Public

regulation is only to be resorted to when both private and enforced private regulation has failed.

3.3.2.2 Voluntary vs. Mandatory

According to Sinclair (1997) a number of policy (regulatory) variables may influence the design of regulations to achieve specific regulatory outcomes. Literature on environmental management, regulatory governance and food safety is drawn on to gain insight into the design (potential nature and content) of instruments used for food safety assurance. Regulatory variables can[13] range from the extent and nature of regulatory compulsion, the extent of regulatory flexibility, industry design input and the extent to which win-win outcomes are the focus of regulation. These variables will be drawn on at different stages in the following sections, to highlight circumstances that demand specific regulatory approaches.

The food industry is a very dynamic one; it is characterised by a high degree of innovation, rapid changes in production processes, hazards and the technologies for managing them, among others. This makes flexibility a very essential, as well as desirable element in regulatory design for controlling safe food. The concept of flexibility refers to the scope enterprises are given to tailor their responses to food safety regulation to their individual circumstances (Sinclair, 1997). Consequently, mechanisms that are prescriptive in nature are unlikely to be able to keep up with the evolutions associated with such sectors. Ensuring that regulations are flexible will allow enterprises to exploit their capability to develop innovative solutions that are cost-effective. Two flexibility components are referred to here: the size of the improvement/upgrade that enterprises are required to make to comply, and the process by which they undertake such upgrades. In this context, flexibility allows enterprises to vary the technologies and processes used to achieve optimal solution, and at the same time, manage the rapid dynamics and innovations known to characterise the GFMVC.

[13] 'Can' is used here because according to Sinclair (1997) this is by no means an exhaustive list.

Statutory regulation (hence mandatory regulation), both in theory and practice has invariably been criticised for stifling innovation and change, and hence on that basis may not be a likely candidate for addressing food safety system failures. Nonetheless, the costs and/impracticalities associated with obtaining detailed information about the specific circumstances of enterprises has spurred regulators to introduce uniform standards in many instances (Stewart, 1992; Sinclar, 1997). The use of international standards, e.g. HACCP and the ISO 22000 international food safety standards, enhance flexibility. Such process-based standards are not prescriptive, instead, the primary focus is on integrating food safety requirements into the manufacturing process and ensuring that it is continually improved based on evidence, and hence matures with time. Such a system provides a high degree of regulatory flexibility both in terms of technical processes and the actual size of improvements required (Sinclair, 1997). In this circumstance, it is possible to have statutory, mandatory regulation that still provides the much needed flexibility required by the food industry.

The regulation of larger industrial enterprises, generally, should lean towards greater flexibility. This is because larger enterprises tend to have greater internal resources to devote to seeking alternative options to overcome food safety risks, which may also be cost-effective. Hence, they are more likely to benefit from flexibility provisions. Nevertheless, smaller enterprises, with limited resources, may prefer prescriptive regulation. This is not to say that regulatory flexibility is not a desirable objective for smaller enterprises (Sinclair, 1997). Even though regulatory flexibility is a desirable element, when there is imminent risk to public health and safety, it is likely to be counter productive. If the risk to human health varies across different sectors and products, then regulatory flexibility could be tempered for high risk sectors and products.

The level and type of compulsion applied to industry is an important regulatory element (Sinclair, 1997) to consider in regulatory design. When food safety regulation is introduced into a sector there are a number of possible responses available to enterprises. Enterprises may exhibit opportunistic behaviour by complying or exiting the market (Henson & Heasman, 1998). In practice however, enterprises rarely adopt

pure strategies such as opportunism and exit. Rather, they tend to adopt mixed approaches, according to the nature of the regulation they face and their own internal organisational structure (Marcus, 1984). The response decision is influenced by a consideration of interactions among different types of incentives which operate at the level of mandated government regulation, pressure from the markets (e.g. demand side shifts created through reputation or certification and labelling) and liability laws (the legal rules regarding the payment of damages to affected parties) (Segerson, 1999; Henson & Hooker, 2001; Jayasinghe-Mudalige & Henson, 2007).

The wealth of literature available suggests that the driver for decision-making and the level of compliance will reflect the enterprises perception of the costs and benefits associated with compliance, including a consideration of the effects of non-compliance (Baron & Baron, 1980; Caswell et al., 1998; Segerson, 1999). However, because costs are difficult to assess (Henson & Heasman, 1998), particularly in the context of enterprises, there is the tendency for in-built bias towards relatively higher perceived costs. In turn, perceptions of the costs resulting from non-compliance will reflect the level of enforcement action by public agencies and the costs imposed on the enterprises, in the case of private regulation. Analysis of the benefits will reflect on industrial (e.g. reduced product waste and improved product safety and quality) and economic improvement (e.g. profitability, market share) that could be obtained upon implementation (Segerson, 1999).

The actual changes effected at the enterprise level, however, will differ according to the type of standards applied, what the specific requirements are and the forms of conformity assessments required to demonstrate compliance with the regulation. Furthermore, the characteristics of the enterprise (e.g. size and export orientation), the product it manufactures, financial situation, resources, level of risk aversion, and the environment in which it operates are all factors that influence the adoption of sophisticated food safety assurance systems (Henson & Hooker, 2001; Henson & Holt, 2001).

Following from the three external incentives for enterprises to comply with food safety regulation, Fares & Rouviere, (2006) argue that because food safety is a credence

attribute of food products, any negative incentives arising from market forces (reputational effects arising from the supply of unsafe food) could be very low. Furthermore, because some of the adverse consequences of providing unsafe food (e.g. death) are irreversible and liability payouts are often done by third party insurance bodies, enterprises may not feel the full effects of the consequences of producing unsafe food. Thus it is only when there is a mandatory threat and it is strong enough that voluntary adoption of food safety is in equilibrium, and this driver is strong enough on its own, without the need for reputational effects (Segerson, 1999) or cost differential assumption (Venturini, 2003). Available evidence (Nash & Ehrenfeld, 1996; Rees, 1997) suggests that even ideal forms of essentially voluntary approaches (allowing the market forces to work, for instance, or even self-regulation) are extremely difficult to attain and a complete absence of compulsion or a mandatory element is often rare (Sinclair, 1997). This reinforces the need for a mandatory element in food safety regulation if is to be efficacious. Venturini, (2003) agrees with this proposition and goes on to add that a strong mandatory threat should be complemented with government support to help enterprises produce safer food for consumers.

If a sector is characterised predominantly by actors that exhibit persistent irrational behaviour towards compliance with food safety requirements, despite clear market signals or information campaigns, there may be a strong case for highly prescriptive, inflexible regulation. In the face of such irrational behaviour, the most immediate and effective solution may be for government to implement mechanisms that make mandatory compliance with set requirements.

The strength of industry representation and the willingness and ability to support governments' objectives will enhance the opportunity for more voluntary requirements. Industry associations can supplement or to a certain degree, work in the stead of government, to act as 'de facto' regulators. The support of industry could free up resources to address non-complying enterprises. This may prove a particularly viable option, if certain value chain actors are likely to be strongly resistant to government intervention. In that circumstance, an overtly coercive regulatory

instrument may be counter-productive (Sinclair, 1997). The rigid application of regulation can destroy moral excellence in the industry (Braithwaite, 1993). To overcome the intrinsic opposition from industry, policy makers may introduce mechanisms that are more skewed towards voluntary approaches, initially. The intent is to win the support and confidence of industry and not to engender further resistance to compliance.

The structure, commitment, level of integration, coordination and capability of industry plays a significant role in the decision to allow for more voluntary approaches. In some context there may be no coherent and strong industry representation or commitment to allow for more voluntary approaches. SMEs may not have high patronage of industry associations and the costs associated with negotiating with individual enterprises could be considerable. Hence enterprises would remain passive participants in the regulatory process, unless government is willing to incentivise such enterprises.

The foregoing discussion emphasises the significant role compulsion or the mandatory element in food safety regulation plays in the response of enterprises to food safety requirements.

Win-win as a regulatory variable is qualitatively different from the other variables discussed so far (Sinclair, 1997). This is attributed to the fact that it is an outcome as opposed to a process. It refers to a measure that enables industry to enhance its competitive position or industrial gain, and at the same time, achieve the objective of regulatory governance. Such an outcome will be alluring to both government and industry alike. In the context of food safety, it means that compliance with food safety regulation could yield industrial and economic benefits (Taylor, 2001; Romano et al, 2004; Trienekens & Zuurbier, 2008), as well as effectively protect consumer health and safety (Smart, 1994; Johnston, 1995).

As with the general debate on regulation, the discussion of win-win outcomes in regulatory contexts tends to adopt highly dichotomous characteristics. Statutory, mandatory regulation is criticised for being prescriptive, with no due consideration to how enterprises go about achieving compliance. Consequently, it is argued that the

majority of enterprises fail to successfully integrate requirements into their wider decision-making processes (Sunstein 1990), and even fewer have implemented integrated process-based approaches. Furthermore, when enterprises have achieved the basic minimum requirement, statutory regulation provides no incentive to achieve further improvement (Sinclair, 1997; Baldwin and Cave, 1999). These arguments put statutory regulation as a potential source of hindrance to the achievement of win-win outcomes.

Self-regulation on the other hand is associated with win-win outcomes. The approach encourages compliance, however, self-regulation, or voluntary forms of regulation are not automatically associated with the pursuit of win-win outcomes, and there may be situations in which it may not be a high policy priority or may even be a counterproductive objective. For example in situations in which there is a high variance between the public interest and the private cost, and as a result, the cost of compliance of enterprises is not fully compensated by industrial and economic improvements, then those regulatory instruments emphasising improvements in performance will rarely be successful in isolation, and hence a more coercive form of regulation may be required. In other circumstances there may be a genuine lack of capital, particularly with SMEs and hence even when such enterprises are convinced of the benefits that could be derived from upgrading to comply with requirements, they would need upfront funding to do so.

The global food industry has become so connected as a result of increased openness to international trade. This has motivated efforts towards a basic minimum requirement for food safety, and current efforts are towards harmonisation of food safety requirements (vanSchothorst & Kaferstein, 2001; Trienekens & Zuurbier, 2008). Countries and enterprises that desire to access particular markets in the GFMVC are required to comply with the basic minimum requirement or are marginalised. If harmonisation is fully achieved the only option for access and survival of enterprises on the global market would be to comply with set requirements or exit. In these circumstances, regardless of whether a voluntary or mandatory approach is adopted in country contexts, the rules governing the global market would still apply, and since

access is dependent on the national reputation, which is carved from the capability of the country, a statutory regulation may well promote a win-win outcome.

The picture painted is that irrespective of whether statutory mandatory legislation is employed or private regulation is adopted, a mandatory element is essential to motivate enterprises to comply with enacted regulations. The practical challenges faced by enterprises also suggest that some form of support might be required to facilitate compliance.

3.3.2.3 Statutory Regulation of Food Safety

Food laws are designed for specific purposes: the protection of public health and safety and/or the promotion of fair trade in food. They regulate specific activities: production, manufacturing, imports, exports, among other things, and address specific aspects: e.g. food safety, food control, and chemical residue.

Food legislation often consists of a basic law that forms the basis for all other regulatory instruments (FAO/WHO, 2003). The basic law contains eight categories of provisions (Table 3-5). Complementary regulation is often enacted and used side-by-side of the basic law, which may, for example, address specific sectors or issues. The structure of the basic law is designed to be consistent with the legal traditions in country contexts (FAO/WHO, 2003; Ehrhardt et al., 2007).

A popular practice with developed countries is to enact comprehensive law and detailed texts which bring together practically all general provisions relevant to food. Administrative authorities then prescribe the technical procedures for enforcement and detailed provisions in respect of particular foods.

Alternatively, the content of the basic law may be limited to setting up administrative structures which enforce the law, together with a few very general principles. This is the popular model used in many developing countries.

Table 3-5: Provisions in a basic food law

Provision	Overview
Scope and definition	Describes the ambit of the law and provides the tools for its interpretation. It often includes a list of definition of terms
General principles	These provisions articulate the general principles that will govern the food control system. E.g. 'this law prohibits the sale of unwholesome food'.
Enabling provisions	Define the nature and limits of the powers to be exercised under it and designates the public authorities in whom those powers are to be vested.
Administrative provisions	Set up the administrative structures to enforce the law
Enforcement provisions	Delegate to an executive authority the power to sanction as well as to take preventive measures in the public interest.
Substantive provisions	Concern specific activities and may either outline requirements in the most basic from or in details, in which case it will be obtained in subsidiary legislation.
Regulations	Outlines the many subjects that relevant Ministers may address though regulation.
Repeal and savings	Lists provisions in which other laws are to be repealed or altered.

(Source: FAO/WHO, 2003; FAO, 2006)

This type of system is inherently flexible, in that the general framework established by the law also mandates an appropriate authority to make rules governing the administration of the law and prescribe technical regulations.

Furthermore, because the law is basic and all details are confined to the regulations and standards, changes that arise as a result of scientific advancements, for example, can easily and quickly be amended by the relevant Minister, as opposed to waiting on Parliament to amend the law.

Public regulation of food safety differs in the degree to which it impedes freedom of activity (Table 3-6). At one extreme, information measures require suppliers to disclose certain facts about their products (e.g. composition, quality), without defining how to achieve this. In other words, it does not prescribe actions for enterprises or restrict behaviour. What information measures do is to prohibit the supply of false or misleading information, and may also require mandatory disclosure of information concerning the product to either consumers or the public, directly by a regulatory agency. By so doing, consumers are able to make decisions about whether the process employed in manufacturing the product is acceptable to them or not (Baldwin & Cave, 1999).

Table 3-6: Forms of statutory food safety regulation

Degree of intervention →				
	Standards			Prior
Information	Target	Performance	Specification	Approval

(Source: Henson and Caswell, 1999)

At the other extreme, suppliers may require prior approval of a product from a regulatory agency before being permitted to release it onto the market. Such approval will be based on pre-specified food safety criteria. Between the two extremes discussed above are a range of food safety standards which require value chain actors to comply with certain basic minimum food safety requirements or commit an offence.

In both developing and developed countries, public food safety regulation takes the form of standards, and these can take three forms: target standards do not prescribe any specific safety standards for the suppliers' product or the processes by which they are produced, but impose criminal liability for pre-specified harmful consequences that arise from their product.

Performance standards require certain levels of safety to be achieved in particular products, and also give suppliers the flexibility to choose mechanisms they deem appropriate to deliver such outcomes. Specification standards are applied both to products and the processes by which those products are manufactured (process

standards) and can take positive or negative forms; either compelling products to contain particular ingredients or use particular production methods. Current reforms by governments are geared towards approaches which are efficacious and impose lesser requirements on industry, while affording greater flexibility to achieve the desired level of food safety in the most effective manner. Even though regulators recognise that end-product testing is an inefficient form of food safety assurance, it is increasingly being combined with approaches that integrate requirements into the manufacturing process (process-based) and are developed on the principles of hazard analysis and critical control points (HACCP). HACCP is widely recognised in the food industry as an effective approach to establish good manufacturing practices for the production of safe food, achieved by establishing process controls through the identification of critical points in the production process, to monitor and control. In some cases, the specific form of HACCP system to be applied is detailed in the regulation. In others, e.g. the EU, there is a general requirement that a HACCP-based food safety assurance system should be in place. The integrated HACCP approaches are complemented with specific attributes of certain food products which are defined in specific standards and used to check the levels of some food safety hazards. These additional attributes are often mandatory in nature, with tort liability law enforcing them, in case of a food safety crisis.

The complexity across the food sector, in terms of the different sub-sectors manufacturers could potentially integrate into and the risk profiles relevant to each sub-sector, coupled with the risk profiles of enterprises and needs of the different consumer groups, make it worthwhile incorporating different approaches so that a blanket approach is not adopted to unnecessarily burden some enterprises. That notwithstanding, integrated process-based approaches have proved successful in managing food safety hazards in the food and drink sector.

Both developing and developed country national approaches to food safety presently employ target and performance standards, information measures, and process standards which integrate requirements into the manufacturing process. Prior approval standards are also being employed in some very high risk sectors.

The differences in application of these approaches vary across countries, with distinguishing features arising from the sectors within which absolute compliance is required and which elements of the regulations are being strictly enforced. Some governments are mandating the use of HACCP as the foundation of food safety management systems. In the US for instance, approaches to food safety assurance before 1996 was mainly through organoleptic inspection. Inspectors assessed the safety of food products by sight, smell and touch. In 1996, chain actors in the meat and poultry processing were required to adopt HACCP systems, without necessarily making provision for demonstration of due diligence, should a food safety crisis occur. Later, proposals were set in place to rollout the HACCP requirement to other US food sectors (Loader & Hobbs, 1999). Countries like Canada, New Zealand and Australia encourage the adoption of HACCP approaches without making adoption mandatory.

3.3.2.4 Private Regulations of Food Safety

Private sector control and management of food safety has also evolved alongside the changes that have occurred in the public sector. Approaches have moved away from the traditional hands-on approach. It is believed that rising world wide incidents have spurred demands to know how food is produced and how its safety is assured. Accordingly retailers have been spurred to translate the requirements of consumer demands and expectation back up to chain actors. Their initial response was to deploy hands-on governance and control to ensure that manufactured products conformed to specific requirements. More defined mechanisms e.g. self-regulation and certification are now being used. The system of rules may be instituted and monitored by an enterprise against certain control parameters. It may include voluntary and cooperative arrangements, co-regulation, negotiated compliance, codes of practice, and equality self-auditing (Baldwin & Cave, 1999).

Certification, on the other, hand involves the setting of product and process safety standards (e.g HACCP, ISO 22000, BRC, IFS) (Henson & Jaffee, 2006) and their associated monitoring of conformity by parties usually outside the enterprise (see section 2.2.2 for methods of conformity assessments). A significant amount of these

certification frameworks specify the minimum basic requirements for the provision of safe food and require supplying enterprises to be certified by third party auditors, before qualifying to supply food. Apart from this trend being motivated by developments in the global food industry, it is believed that the increasing transaction costs associated with the hands-on approach to governance initially adopted by retailers to manage their suppliers is also a significant influential factor, because of the increasing number of suppliers retailers have to deal with, and their spread in terms of geographical location. Hence using certification frameworks is the most cost-effective way.

3.3.3 Organisational Arrangements

A number of functionally equivalent organisational or agency systems are possible for national (public) food control activities (FAO/WHO, 2003: Ehrhardt et al., 2007). The agency system is made up of two components: agency structure and the internal and external processes (Berg, 2000). The structure is defined by how it relates to government entities, while the process determines how the agency relates to other stakeholder groups. In some cases, the structure would take the form of an independent (autonomous) regulatory agency, which acts on behalf of government, but has been given the autonomy to develop policy, regulate the industry and ensure compliance with enacted regulations. In other circumstances they are departments within Government Ministries and sometimes a hybrid structure is adopted (semi-independent bodies).

Three agency systems are discussed in this study:

- A system based on a single, unified agency for food control - Single Agency System;
- A system based on multiple agencies responsible for food control - Multiple Agency System;
- A system based on a national integrated approach - Integrated System.

3.3.3.1 Single Agency System

In a single agency system, the responsibility for protecting public health and safety is trusted into the care of one agency, and roles and responsibilities are clearly defined. Such a system presents lots of merits as the inherent system structure is characterised by uniform application of protection measures, capability to quickly respond to emerging challenges and the demands of both domestic and international markets. It presents the opportunity to provide more streamlined and efficient services and improved cost efficiency, and also has the advantage of more effective use of resources and expertise.

Because food control systems evolve and often initiatives are developed on existing structures (due to resource and capital intensiveness of entirely new designs), there are often fewer opportunities for countries to design and develop new systems based on a single agency. At the same time, recommending one agency structure that can easily adapt to the requirements and resources of every country's socioeconomic and political environment is often not possible because the organisational arrangement chosen is influenced by the national strategy. Therefore, the choice must be country specific, and a participatory approach should be adopted so that all concerned can have the opportunity of making an input into the development process.

3.3.3.2 Multiple Agency System

Food control systems have their primary objective as ensuring safe food; systems designed for such purposes may also have an economic objective of creating and maintaining sustainable food processing and manufacturing systems. Accordingly, food control systems have a significant role in e.g. promoting international trade, ensuring food security, preventing avoidable losses and ensuring best food codes of practices. The systems that deal specifically with these other objectives can be sectoral, i.e. based on the need to develop particular sectors e.g. the fish and fishery products, vegetable oil, and may be mandatory or voluntary, and put into effect either through a general food law or sectoral regulation (FAO/WHO, 2003). When these sectoral initiatives result in the establishment of separate food control activities, as a result,

separate agencies, the resulting agency system is 'multiple', with responsibilities for food control. Under such circumstances, food control responsibilities are shared between Government Ministries e.g. Health, Trade and Industry, Tourism, and the role and responsibilities are specified but quite different. Different agencies may also be involved in food control activities at the national, state and local levels. There are numerous practical challenges with such systems. It is often characterised by duplication of regulatory policy and activity, increased bureaucracy, lack of coordination between the different agencies responsible for food policy development, its enforcements and monitoring.

The effectiveness of such a system therefore depends on the capability and efficiency of the agency responsible at each level, as well as on the ability to coordinate these agencies and their responsibilities at the national level. This is the popular organisational arrangement model in practice

3.3.3.3 Integrated Agency System

Given that different agencies may be involved in food safety assurance, collaboration and coordination are essential elements in a food system, particularly in contexts where resources are limited. An integrated system presents a more justified system for the involvement of different regulatory agencies.

Integrated systems have four levels (FAO/WHO, 2003):

1. Formulation of policy, risk analysis, and development of standards and regulations;
2. Coordination of food control activity, monitoring and auditing;
3. Inspection and enforcement;
4. Education and training.

An autonomous national food safety agency may be appointed and given the responsibility for the first two levels (Levels 1 and 2), with existing multi-sectoral agencies retaining responsibility for Levels 3 and 4 activities.

Such a system provides the following advantages (FAO/WHO, 2003):

- Provides coherence in the national food control system;

- Politically more acceptable as it does not disturb the day to day inspection and enforcement role of other agencies;
- Promotes uniform application of control measures across the whole food chain throughout the country;
- Separates risk assessment and risk management functions, resulting in objective consumer protection measures with resultant confidence among domestic consumers and credibility with foreign buyers;
- Better equipped to deal with international dimensions of food control such as participation in the work of Codex, follow-up on SPS/TBT Agreements, etc;
- Encourages transparency in decision-making processes, and accountability in implementation; and
- Is more cost-effective in the long term.

There may be other circumstances in which the government department or agency may lack the capability or incentive to effectively monitor and enforce regulations (Ehrhardt et al. 2007). In this case, new organisational arrangement may be contracted out in support of government departments and agencies to increase capacity to enforce rules.

Whichever structure is adopted, it is essential that the legal mandate for the agency is clearly defined. This is the law that establishes the regulator, and must clearly define regulatory roles and responsibility, scope of jurisdiction, and provide appropriate authority. The law must also clearly establish the objectives of the agency, and the specific policies that support the objectives established in the law, the instruments and mechanisms for ensuring food safety (Berg, 2000). The law must provide appropriate authority, instruments and mechanisms for ensuring accountability. It must be defined in such a way that it does not change with changes in political governments or external political influences are minimised or avoided, if possible (Stern & Holder, 1999; Ehrhardt et al. 2007).

Some regulatory advisors advocate the use of an independent regulator as a best-practice model, as it has proved very successful in countries such as the United States, the United Kingdom, and Australia (Ehrhardt et al. 2007; Australian Government,

2007). In practice, however, the model that works best depends on a country's objectives and circumstances. The choice of organisational arrangement must be made carefully to ensure an appropriate fit with the existing institutions and legal instrument used for regulation.

It must be noted here, however, that the effectiveness of the regulatory system does not only depend on the choice of an agency system that fits the country contexts, with clearly defined legal mandate. The effectiveness is also influenced by the values that guide regulatory operations and the resources available to execute regulatory functions. Policy makers therefore have to understand the interplay between the legal mandate, values and resources and how they impact on the complex system of regulatory governance, as without one of these critical elements the system will not function effectively. Sections 3.3.4 and 3.3.5 will address values and resources for regulatory systems.

3.3.4 Values

Values are the core principles that support and guide the daily activities of institutions (Berg, 2000). In terms of food safety assurance in the GFMVC, this will comprise the national shared values and the shared political vision, which will influence the values that shape the operations of regulators. For example, if the national shared values tolerate risk, uncertainty, and are comfortable with unstructured situations, this will be reflected in the nature of decisions concerning how to ensure that food is safe for consumers and in the nature and content of rules designed to guide industrial behaviour.

The values that guide regulators must be consistent with meeting the objectives of the agency. Values encompass the attitudes that must be exhibited by the leadership and employees of regulatory agencies to attain the trust of stakeholder groups (customers, investors, and government ministries)**.** They include the processes that ensure that stakeholders have confidence in the integrity of the governance system and the type of information required.

The following best practice principles are drawn from the works of the Australian Competition Commission, Sinclair, 1997, and Berg, 2000, and are essential for the success of initiatives to ensure food safety and access to international markets:

Transparency and accountability: Regulatory decisions need to be clear, widely accepted and publicly accessible. Transparency ensures that the general public and special interest groups can see the rationale behind agency decisions (Berg. 2000), which in-turn influences legitimacy (Ehrhardt et al. 2007). This encourages trust between regulatory agencies and other chain actors. Interactions between regulatory agency staff and enterprises enhance transparency. Through this process, agency staff can benefit from free flow of ideas (information) between the different groups. This value will be supported by well organised communication channels and activities which open the regulatory process to the light of day; highlight the priorities and analyse underpinning decisions. Accountability and transparency work hand-in-hand. Transparency will ensure that the operations of regulators are open to public scrutiny and this would create a strong incentive for the prevention of corruption and achieving performance targets (accountability). This will require that clear processes for performance management and review are established to ensure that the objectives of regulatory system are met.

Independence: Ensures autonomy in decisions and freedom from undue political influence. It is significantly influenced by funding sources, who approves funding, how members of the regulatory body are appointed and the ability of the agency to make decisions on its own (Stern, 1997).

Consistency: Will ensure that the same standards are interpreted and applied/enforced in the same way by different authorised officers, with the same stakeholder groups over time. This gives the regulated confidence that fairness is being achieved.

Predictability: Reputation facilitates planning amongst trading partners. Credibility within the international market is promoted with investors being able to forecast future trends in regulatory rulings (Berg, 2000). Internal agency procedures determine

the consistency and predictability of decisions to a large extent and therefore, are essential for successful regulation (Berg 2000).

3.3.5 Resources

Resources are critical for effective execution of the duties of the regulatory agency. These will permit the regulatory agency to complete its assigned functions effectively. They include the infrastructure, budget size, the leadership required, professionals and staff. Consideration should be given to funding and staff development because these affect the performance of the system (Berg, 2000; FAO, 2006).

The funding mechanisms have implications for the sustainability of the agency and its degree of independence (Berg, 2000; Ehrhardt et al. 2007), and hence should be designed in such a way that it reduces the likelihood of political meddling. The political process should not be used to punish regulatory agencies for particular decisions; otherwise, regulatory time horizons will be the same as that of officials elected (Berg, 2000).

The mix of resources available to regulators is also a critical component of the capability of regulators to execute their functions effectively. The quality and independence of those appointed to positions of leadership are signals to investors and consumers as to whether the government is truly serious about implementing sector reforms. Experts in the relevant fields in the control of, and assurance of food safety for example, food scientists and technologists, manufacturing engineers, as well as other expects in the field of for example, economics, and law are also necessary to analyse policy options. Having a lower staff turnover is important. Consequently, these staff members must be provided with adequate incentives to remain with the agency (Berg, 2000).

The existence of one or a combination of two of the essential elements for effective regulatory systems (the legal mandate of regulators, value and resources) without the third variable renders the system ineffective. For example, without shared values, there may be no proper structure for decision-making, and this affects the consistency of operational activities; the lack of a legal mandate also opens up regulators to

challenges in the execution of their duties. As a result, full congruence is critical for the system to deliver the objectives for which it was designed. Achieving all the three ideal regulatory elements in practice is however, fraught with challenges, and this makes the work of the regulator very difficult; particularly, when entirely eliminating political influences in most cases is not always practical. Political influences may not always be negative. The key is, therefore, to ensure that there is a safety valve that at least constrains politicians to make coherent decisions and honour long –term commitments (Berg, 2000; Ehrhardt et al. 2007; Mandri-Perrott, 2009).

3.3.6 Drivers for, Benefits of, Challenges to Food Safety Management System Implementation at the Enterprise Level

The past few decades have seen significant new developments (section 2.2.3) that have tightened controls for food safety in different countries. In response, the interest of most researchers in this research community has shifted to understanding the evolving competitive landscape as a result of these new developments. Some researchers are also examining the response of enterprises to food safety regulation from different geographical positions, to inform policy decisions that will benefit both small and medium enterprises (SMES) and larger enterprises, and positively project the reputation of countries on the international market. The environmental and quality literature is fairly grounded in terms of the role of regulation in assuring environmental sustainability (see Rugman & Verbeke, 1998a; 1998b), product quality, the drivers, benefits and challenges to compliance. The food safety literature is increasingly drawing on these two perspectives to inform explanations on the response of enterprises to food safety regulation, and how it affects enterprises

However, Loader & Hobbs (1999) suggest that enterprise response to food safety regulation may be different to other forms of regulation because of the sensitive nature of food safety issues and their immense perceived importance. In spite of this, in all three types of regulations (environmental, quality and food safety), enterprises are expected to take action in order to protect the environment, public health and safety.

Table 3-7: Key driver, benefits and challenges to FSMS implementation

Themes	Sector	Country	Authors
Benefits			
Enhanced access to markets	Meat and dairy sector	Italy/Australia	Khatri & Collins, 2007; Romano et al,2004; Taylor, 2001
Cost effectiveness/Reduced cost	Meat, dairy and poultry processing	Italy/Australia/Canada	Khatri & Collins, 2007; Romano et al, 2004; Taylor, 2001
			Jayasinghe-Mudalige & Henson, 2007
Time savings	Meat and dairy sector	Italy	Romano et al, 2004
Reduced customer complaints	Meat industry	Australia	Khatri & Collins, 2007
Production efficiency	Meat and dairy sector	Italy/Australia	Khatri and Collins, 2007; Romano et al, 2004;
Enhanced employee efficiency,	Meat and dairy sector	Italy/Australia/Canada	Khatri & Collins, 2007; Romano et al, 2004; Taylor, 2001;
employee skills and quality			Jayasinghe-Mudalige & Henson, 2007
Improved information and communication	Meat and dairy sector	Italy	Romano et al, 2004;
Organisational development, team building		UK	Taylor, 2001
Legal protection		UK	Taylor, 2001
Increased confidence in products		UK	Taylor, 2001
Competitive edge	Red meat and poultry processing	Australia/Canada	Jayasinghe-Mudalige & Henson, 2007; Loader & Hobbs, 1999;
Protection of reputation and brand image	Meat and poultry processing	Canada	Jayasinghe-Mudalige & Henson, 2007
Protection of market share	Meat and poultry processing	Canada	Jayasinghe-Mudalige & Henson, 2007
Improved product quality and safety	Meet and dairy sector	Italy	Romano et al, 2004
Drivers			
Legislative requirement	Red Meat and poultry processing	Canada/Australia, US, UK, Australia, New Zealand	Jayasinghe & Henson, 2007; Khatri & Collins, 2007;Yapp & Fairman, 2006; Taylor, 2001; Hensons & Hooker, 2001; Loader & Hobbs, 1999
Industrial standards compliance	Catering	UK	Yapp & Fairman, 2006
Environmental protection	Catering	UK	Yapp & Fairman, 2006
Insurance requirement	Catering	UK	Yapp & Fairman, 2006
Customer requirement	Red Meat, diary poultry processing and catering	Australia/Canada/UK	Khatri & Collins,2007; Yapp & Fairman, 2006; Taylor, 2001; Henson and Hooker, 2001
Improved business efficiency	Catering	UK	Yapp & Fairman, 2006
Employee pressure	Catering	UK	Yapp & Fairman, 2006
Investor pressure	Catering	UK	Yapp & Fairman, 2006
Enhanced corporate image, reputation	Meat industry	Australia	Khatri & Collins, 2007
Procedural efficiency	Red Meat and poultry processing	Canada	Jayasinghe-Mudalige & Henson, 2007
Liability laws	Red Meat and poultry processing	Canada	Jayasinghe-Mudalige & Henson, 2007; Henson & Hooker, 2001
Good practice	Red Meat and poultry processing	Canada	Jayasinghe-Mudalige & Henson, 2007
Challenges			
Lack of trust in food safety regulation		UK	Fairman & Yap, 2004; Petts, 1999
and enforcement officers, inconsistent enforcements, remoteness of enforcements			
Lack of motivation	Catering	Canada/Australia, US,	Yapp & Fairman, 2006; Loader & Hobbs, 1999
		UK, Australia, New Zealand	
Lack of awareness, skills, knowledge, understanding about requirements		UK/Australia	Trienekens & Zuurbier, 2008; Aggelogiannopoulos et al. 2007; Khatri & Collins, 2007 ; Yapp & Fairman, 2006, Fairman & Yapp,2004; Taylor, 2001
Lack of support	Catering	UK	Yapp & Fairman, 2006
Lack of access to information	Catering, retail	Bulgaria, Canada/Australia,	Yapp & Fairman, 2006;
		US, UK, Australia, New Zealand	Vladimirov, 2011; Loader & Hobbs, 1999
Lack of interest	Catering	UK	Yapp & Fairman, 2006
Lack of management systems	Catering	UK	Yapp & Fairman, 2006
Record keeping	Catering	UK	Yapp & Fairman, 2006; Fairman & Yapp, 2004; Taylor, 2001
Lack of external linkages	Catering	UK	Yapp & Fairman, 2006
Lack of conviction that HACCP is effective		UK	Fairman & Yapp, 2004
The belief that existing procedures are safe		UK	Fairman & Yapp, 2004
Excessive cost of implementation	Red meat and poultry processing	Canada	Jayasinghe-Mudalige & Henson, 2007
Lack of funds/cost of capital	Catering	UK/Australia	Aggelogiannopoulos et al. 2007; Khatri & Collins, 2007; Yapp & Fairman, 2006; Taylor, 2001;
Lack of time	Catering	UK	Aggelogiannopoulos et al. 2007; Yapp & Fairman, 2006;Taylor, 2001
Culture of resistance to change	Food retail	Bulgaria	Vladimirov, 2011
Nature of the regulation		UK	Fairman & Yapp, 2004
Lack of skilled professional	Red meat and poultry processing	Canada	Jayasinghe-Mudalige & Henson, 2007, Taylor, 2001
Difficulty in vetting suppliers	Red Meat and diary sector	Australia	Khatri & Collins, 2007

The wealth of literature available (e.g. Loader & Hobbs, 1999; Henson & Hooker, 2001) gives insight into the behaviour of enterprises, which suggest that the response of

enterprises is not automatic; It is complex (Vladimirov, 2011) and reflects the interplay among different types of incentives operating at the level of mandated government regulation, pressure from the market and liability laws (Henson & Hooker, 2001; Fairman & Yapp 2004; Jayasinghe-Mudalige & Henson, 2007; Khatri & Collins, 2007).

Whether enterprises respond in a positive or negative manner depends on a variety of factors e.g. sector, enterprise size, financial situation (Loader & Hobbs, 1999; Taylor & Kane, 2005; Eves & Dervisi, 2005; Vladimirov, 2011) and level of risk adversity, among other things (see Table 3-7 for drivers for, benefits of, and challenges to the implementation of FSMSs). Furthermore, the impact of these incentives on the enterprise is dependent on their perception of costs and benefits of compliance or non-compliance. From existing studies, it is apparent that regulation is a very important incentive for compliance in most countries and the degree of enforcements applied could cause even the smallest of enterprises to comply without question.

3.3.7 Factors Influencing Successful FSMS Implementation at the Enterprise level

A variety of studies have looked at the impact of implementing an integrated food safety management system in countries e.g. Canada Jayasinghe-Mudalige & Henson, 2007), Italy (Romano, et al, 2004) and Australia (Khatri & Collins, 2007), in different sectors e.g. catering, meat and poultry processing, without necessarily examining what ensures successful implementation. This is indicative of the fact that there is paucity of research on relevant factors to consider for successful implementation. A myriad of papers have focused particularly on how to implement the HACCP component of international standards, and have identified barriers (e.g. Taylor, 2001) and challenges faced by enterprises.

Reflecting on these barriers (Table 3-7) and challenges gives insight into what the requirements are if the implementation of food safety management systems is to be successful as well as effective. Trienekens & Zuurbier (2008), however, draw on the literature on quality to explicitly suggest that adequate information should be available

for planning, execution, and monitoring functions. In addition to this management support is also essential for successful implementation.

3.4 Overview of Current Issues in Food Safety

Ensuring public health and safety sits among the priorities of most governments, and this puts food safety among issues that will continue to be relevant. This is particularly so as interdependencies and openness to trade among countries, and advancements in technology (e.g. Information and communications technology and transportation) continue to blur the boundaries to international trade in food (Motarjemi, et al., (2001). The emergent structure and governance of the global food economy, having different countries with different rules, standards and requirements, and different tolerances for risks and food safety hazards creates challenges for actors in the global food economy. The following section looks at harmonisation as a potential solution to some of these challenges, and investigates what challenges might limit global harmonisation.

3.4.1 Global Harmonisation of Food Safety Regulation

Global harmonisation of food safety regulation is a necessity. This is partly because of the moral obligation that human beings have towards each other and towards the observation of the Universal Declaration of Human Rights (1948).

According to Motarjemi, et al., (2001), the word 'safety' was not explicitly mentioned in the declaration, however, it was implicitly understood that safety was an intrinsic quality of food and thus the term 'food' means 'safe food'. By virtue of this declaration of Human Rights, it is believed that all human beings, regardless of race, colour, sex, religion and social origin have equal rights. This could be interpreted as all human beings have a right to the same standard of food safety and the same degree of health protection from food borne diseases (Motarjemi, et al., (2001). Hence, the implementation of global harmonisation of food safety regulation is a significant step towards recognising the right of all humans to have safe food. This will contribute to ensuring that humans around the world benefit from the same degree of health

protection from food safety risks and the same standards of food. It is, however, recognised that taking this initiative alone would not ensure the same degree of health protection, as a number of other elements (e.g. enforcements, infrastructure, responsibly operating food sectors and consumer education programmes) within domestic context will also play a significant role.

There are also practical and economic reasons why global harmonisation of food safety regulation is crucial. Food safety problems are becoming globalised because of things such as international travel and migration, globalisation of cultures and values, globalisation of food supply; which implies that food safety problems of one country are also food safety problems for another country. This is because advances in food science and technology have taken place in tandem with advances in transport technologies, and hence food is easily transported across national boundaries, and has facilitated the globalisation of food. These changes have been complemented with the increased openness to trade due to the Uruguay Round and multilateral trade negotiations as discussed in section 2.2.2.1. International travel and migration, also facilitated by advances in transport technologies means that people are now more able to move freely. This also means that people may be affected by food safety problems in countries other than their own (Cartwright & Chahed, 1997). International travel and migration may lead to changes in lifestyles and food habits, values and cultures. Hence concerns for food safety problems in one particular country or region may be shared by others. Global harmonisation of food safety regulation will help ensure fair competition among countries, in terms of trade and at the same time, it will help ensure that all populations enjoy the same degree of food safety.

Advancements have been made towards harmonisation of food safety regulations as discussed in section 2.2.2.1. These include the development of the food code by the Codex Alimentarius Commission, the SPS and the TBT agreements. One of the concerns that have been raised over the years is the criteria for establishing the appropriate level of health protection (taken from the SPS Agreement clause, suggesting that WTO Member States are expected to accept the sanitary and phytosanitary measures of others as being equivalent if the exporting country demonstrates to the importing

country that its measure meets the importing countries appropriate level of health protection). The question has been 'what is the appropriate level of protection?' The ensuing debate at the international level on this subject has led to the development of new concepts such as food safety objectives. The SPS agreement has opened up new questions concerning equivalence, appropriate level of health protection and food safety objectives. Nevertheless, the SPS agreement together with the TBT agreement has fostered harmonisation of food safety regulations.

In the private spheres, international standards are fostering the move towards a unified approach to global food safety regulation. Notable among these are the introduction of the ISO 22000 International Food Safety Standards for Food Manufacturers and the Global Food Safety Initiative (section 2.2.3.3). The quest to truly harmonise food safety regulation on a global scale is still ongoing. However, there are challenges which should be addressed if harmonisation is to be truly achieved. The next section seeks to discuss some of the challenges impeding progress.

3.4.1.1 Chemical Challenges

There are scientific and societal challenges impeding the realisation of a truly harmonised food safety regulation. Scientific challenges refer in this context to all the tasks and endeavours needed to collect the necessary scientific data for making appropriate and transparent decisions (Motarjemi, et al., 2001). The requirement to justify food safety regulation through scientific risk-based assessment has made risk analysis the foundation for decision-making on food safety. Risk analysis consists of three inter-related areas of work: risk assessment, risk management and risk communication (FAO/WHO, 2003). Global harmonisation of food safety regulation would require an internationally agreed appropriate level of health protection (Matarjemi, et al., 2001), which is very much in line with the Universal Declaration of Human Rights. Accordingly, the establishment of such an agreement, including the corresponding food safety legislation is desirable. Common standards have so far been feasible mainly for certain chemical hazards, such as food additives and pesticide residues. This is because of the relative ease of harmonising food safety legislation in

respect of these chemical hazards, relative to biological hazards. The following factors further explain why reaching global legislation for certain chemical standards have been relatively easier (Matarjemi, et al., 2001):

- Chemical hazards in food are easier to control than biological hazards, which are dependent on a number of environmental and human factors;
- There are already internationally agreed principles for the risk assessment of chemical hazards;
- The risk assessment of chemicals is based on toxicological studies in animals and , sometimes, even on human data; and
- There is international agreement that the presence of certain chemical hazards should not present any appreciable risk to human health.

3.4.1.2 Biological Challenges

In the context of biological hazards, the situation is more complex and difficult. For instance, the definition of appropriate level of health protection and how this is to be measured is not yet known (Motarjemi et al., 2001). The International Commission on Microbiological Specifications for Foods suggests that the highest acceptable number of food borne illnesses per 100000 populations could be considered as a criterion for establishing an appropriate level of health protection (van Schothorst, 1998; Motarjemi et al., 2001). Even with this approach, there are a number of impeding problems to be addressed. The first concerns the availability of accurate and reliable data on the incidence of food borne diseases in different parts of the world, if at all possible, considering the weaknesses in programmes for surveillance of food borne illnesses. Secondly, the control of food borne illnesses or food hazards of biological origin is difficult since different types of factors (human, technological and climatic) intervene, and this means to control these factors in different countries will vary considerably. As a result, protecting consumers from food borne hazards is not merely a matter of establishing food safety legislation, but also strengthening the necessary infrastructure and providing adequate education to people to control as many of these factors as possible (Motarjemi et al., 2001).

Another major barrier to global harmonisation of food safety regulation are the differences between countries in terms of feasibility to meet certain regulations. The risk management approach requires that the acceptable level of risk should be determined primarily from a human health point of view, and that arbitrary or unjustified differences in risk levels should be avoided. However, other factors such as economic costs, perceived, technical feasibility and societal preferences, need to be taken into consideration, particularly in the determination of measures to be taken. These factors vary from country to country, between the developed and the developing countries. Other challenges to harmonisation arise from the application of the risk analysis framework. Risk assessment consists of hazard identification, hazard characterisation, exposure assessment and risk characterisation. Data is required to conduct all these assessments, however, the practical challenges inherent in collecting the data poses a problem for global harmonisation of food safety regulation. Furthermore, the populations around the would differ a lot in terms of their perception, values, culture, religion and lifestyles needs and motivation, as well as levels of education. Countries have different means of communication. The language and terminology are main barriers to adequate risk communication and many sometimes create confusion and misperception.

3.4.1.3 Societal Challenges

There are also societal challenges around balancing the interest of the various stakeholders. Particularly, these concerns:

a. Balancing the interest of the developed and the developing countries; this will ensure that in the bid to provide an adequate level of health protection for all countries, no country is unduly discriminated against. At the same time, developing countries will need assistance from developed countries to achieve the appropriate levels of health protection.
b. Balancing the interest of large vs. small industries; the GFMVC is as strong as its weakest link. And these are mostly formed by SMEs. Care needs to be taken

to ensure that SMEs are not marginalised, and adequate support from government is provided to facilitate compliance with set requirements.

c. Balancing the risk posed by biological and chemical hazards; international trade in food is an important source of economic growth. Furthermore, food production, manufacturing etc, are sources of livelihoods and support for economies, as they provide jobs. However, these activities should not be undertaken at the expense of food safety and the health requirements of the population.
d. Balancing consumer concerns and advances in sciences and technology.
e. Balancing efforts for economic growth and food safety considerations.
f. Balancing the interests of consumers and industry.

According to Motarjemi et al., (2001), global harmonisation of food safety is a challenge in the 21st century; however, it is indeed an overriding necessity. Nevertheless, the quest to reach it should not compromise the benefits that can be drawn from economic growth, advancements in science and technological developments, or penalise the weakest in society.

CHAPTER 4: METHODOLOGY

This chapter discusses the philosophical stance adopted for the research and gives an overview of the underlying philosophical foundations/assumptions of the worldview chosen. The chapter also gives an overview of the research design strategies available and explains the rationale behind the designs adopted, their related methods (techniques) employed for data collection, data analysis and interpretation.

4.1 Research Methodology: Definition

Research methodology comprises theories and methods, and advances philosophical assumptions about the social world. The assumptions provide the foundations for research and help the researcher select a particular type of research design strategy and its related techniques for data collection, analysis and validation at different stages (Creswell, 1994).

Often times, research methodology, research strategy, and methods are confused or used interchangeably by many researchers. It is therefore important that these concepts are clarified in the context of this research. The definitions adopted are those provided by Creswell & Plano Clark, (2007).

The concept *'methodology'* is used in this research to refer to the philosophical framework (worldview) and the fundamental assumptions of research (van Manen, (1990) as cited by Creswell & Plano Clark (2007)). *Research strategy* on the other hand, is used to refer to the plan of action that links the philosophical assumptions to specific methods. Case studies, experimental research and surveys are all examples of research strategies (Creswell & Plano Clark, 2007; Easterby-Smith et al., 2008; Yin, 2009). *A method* is used to depict techniques for data collection, analysis and interpretation, as well as validation.

4.2 Epistemology

Designing and executing research requires a consideration of several factors which include, but are not limited to the philosophical position that informs the enquiry (Slife

& Williams 1995; Guba & Lincoln, 2005; Blaikie, 2007). The philosophical stance is of particular significance because it has underlying assumptions and methodological implications that provide legitimacy for the strategies applied to the research. Hence, adopting a particular strategy that is characteristic of a particular philosophical stance is indicative of assumptions the researcher makes about what is reality, what knowledge is and the methods of gaining knowledge (Creswell & Plano Clark, 2007).

4.2.1 Epistemological Dichotomy

Two contrasting views of how social science research should be conducted have generally been expressed; these are positivism and constructivism (Creswell & Plano Clark, 2007; Easterby-Smith et al, 2008). Positivism has it that the social world exists externally and that its properties should be measured objectively. Objective knowledge or facts are gained from direct experience or observation, and is free from the influence of the researcher. This worldview looks for the existence of a constant relationship between events or variables. Advocates of the worldview argue that it is a more credible way of investigating human and social behaviour because every scientist looking at the same bit of reality sees the same thing. The positivist worldview is typically associated with quantitative research.

Contrary to the positivism tradition, constructivism relies on the understanding or meaning of phenomena formed from the interpretations of participants and their subjective views (Creswell & Plano Clark, 2007). The meaning of phenomena and understanding of participants are influenced by their background, personal histories and social interactions with others, and hence the constructivism philosophical stance is value-laden. The task of the researcher is hence to understand the multiple social constructions of meaning and knowledge, and present them accurately. The constructivism worldview is typically associated with qualitative approaches.

4.2.2 Epistemology from the Social Science Perspective

The philosophies of science continue to evolve (Creswell & Plano Clark, 2007), and different researchers have over the years presented their categorizations of what they

might be, based on the major stages in the paradigm debate (Tashakkori & Teddlie, 1998), and describing the characteristics they all have in common, (Slife & Williams, 1995; Guba & Lincoln, 2005).

Easterby-Smith et al., (2008) acknowledge the two contrasting worldviews as part of the philosophical stances available and add a third: relativism, and suggest that they (constructivism, positivism and relativism) are pure philosophical stances from the perspective of management science.

The relativists account of how the social world works is presented through the eyes of participants. In other words, it rejects the notion of external reality being independent of a participant's theoretical beliefs and concepts. Reality from the perspective of this worldview is constructed only by means of a conceptual system, and hence objective reality cannot be claimed because different cultures and societies have different conceptual systems (Robson, 2002).

Apart from the aforementioned philosophical stances there are other research philosophies in the context of social science. Table 4-1 gives an overview of a selection. Critical realism, which is also another philosophical position, provides a scientific approach which is different to that proposed by positivism; however, at the core of the worldview is the notion that reality exists and is independent of our awareness of it. It is theory–laden and suggests that the things described by theory actually exist; however, more than one theory can explain a phenomenon. The philosophical paradigm is particularly appropriate for research in practice- and value-based professions. The philosophical position suggests that the outcome of an action follows from mechanisms acting in particular contexts (Robson, 2002). More than one mechanism may be involved in a particular situation, and hence is context-specific. Critical realism accepts that there are fundamental differences between natural and social phenomena.

Table 4-1: Comparison of social science epistemologies

World View Element	Positivism	Constructivism	Advocacy and Participatory	Pragmatism	Critical Realism
Ontology -what is the nature of reality?	Singular reality - truth is universal	Multiple realities -the perspective of the respondent, researcher	Political reality - findings are negotiated with participants	Singular and multiple realities - researcher test hypotheses and provides multiple perspectives	Reality is stratified
Epistemology - what is the relationship between the researcher and that being researched?	What is being researched is external to the researcher - data must be objectively measured.	Closeness - researcher depends on the meanings respondents give to the phenomenon	Collaboration - researchers actively involve participants as collaborators	Practicality - researcher collects data on what works	There are theories expressing tendencies of things which can be disputed. Models and structures are created to account for observed phenomena
Axiology - What is the role of values	Value-free	Value-laden	Value-laden	Value-laden	Value-laden
Methodology - what is the process of research?	Deductive - researcher tests a prior theory	Inductive - patterns and theories are developed from participants view	Participatory - researchers involve participants in all stages of the study and engage in cyclical review of results	Combining - researchers collect both quantitative and qualitative data and mix them	Different methods have to be used for different subject matters

(Source: Adapted from Robson, 2002; Creswell & Plano Clark, 2007)

As a result, social objects can be studied scientifically but different methods have to be used for different subject matters, yet still share common principles.

The pragmatism world view is typically associated with mixed methods. The philosophy posits that in the social world there are no pre-determined theories or frameworks that shape knowledge and understanding, and that basically, any meaningful structures which get developed come from the lived experiences of individuals. In other words meanings are constructed based on what works in practice (Robson, 2002; Creswell & Plano Clark, 2007). Pragmatists have it that reality is both singular and multiple (e.g., researchers test hypotheses and provide multiple perspectives), complex, constructed and stratified. Advocates believe that any particular set of data is explicable by more than a single theory. It is value-laden. Multiple methods are used to collect data to inform the research problem and the focus is primarily on the questions asked rather than on the methods.

The Advocacy and Participatory worldview presents a notion of what is known from four subjective perspectives: experiential, presentational, propositional and practical (Heron & Reason, 1997). A collaborative form of enquiry is used, in which all involved engage together in a democratic dialogue as co-researchers and as co-subjects. It is often influenced by political concerns. The philosophical position is often associated with qualitative approaches than quantitative approaches; however, this association should not necessarily be made. The primary aim of the paradigm is to ensure that the social world is changed for the better, so that individuals will feel less marginalised (Creswell & Plano Clark, 2007).

4.3 Research Approach: Quantitative or Qualitative or Mixed?

Different illustrations are used by different researchers with regards to what choices of research strategies are available. Easterby-Smith et al., (2008) have used the three pure epistemological stances to distinguish between the different strategies. The authors acknowledge that other text books distinguish between different research strategies using the nature of the data collected as a fundamental basis: either numbers or data that can be expressed as numbers (hence quantitative approach) or

textural descriptions (hence qualitative approach). However, the authors argue that this simplification can be a source of confusion, as qualitative and quantitative methods may be used according to both constructivist and positivist epistemologies (Easterby-Smith et al., 2008). This view is in harmony with the view of Stake (1995), who suggests that the distinction between quantitative and qualitative approaches is a matter of emphasis, because both are mixtures.

Robson (2002) and Creswell & Plano Clark (2007) give an operational view on the issue of qualitative and quantitative approaches to research strategy. This view is useful because it gives the researcher different operational elements to consider at different stages of the research. Qualitative and quantitative research both address the same elements in the process of research, but differs in the way that each step is implemented (Creswell & Plano Clark, 2007). No single study perfectly fits all of the elements.

The intent of quantitative research is to use data provided by participants (or collected through experiments) to support, refute or explain an existing theory (i.e. model, framework, or explanation), using a deductive form of logic. This nature of the intent means that a significant amount of pre-specification takes place, either in terms of a conceptual framework or theory, so that the researcher knows in advance what to look for before venturing into the main part of the research. The pre-specified theories remain fixed throughout the study and hence are often called 'fixed designs' (Robson, 2002). Fixed designs normally follow tried and tested procedures, and a high degree of control is exercised over the research environment, to ensure validity. Experiments and surveys are typical examples of fixed designs.

On the other hand, the primary intent of qualitative research is to seek the perception of participants about a particular phenomenon. An inductive logic is used to collect data from participants, which is then analysed, and interpreted, with the aim of developing theory. Qualitative research often does not require significant pre-specification (Robson, 2002) as the design evolves and develops as the research proceeds (and hence is often called flexible designs) (Marshall & Rossman, 1999: Robson, 2002).

From Table 4-2, it is realised that the use of literature in both qualitative and quantitative research also varies, even though both approaches use literature to justify the research problem. In qualitative studies, a researcher reviews literature to provide legitimacy (evidence) for the purpose of the study and the underlying problem being addressed.

Table 4-2: Elements of qualitative and qualitative research methods

Elements of qualitative research	Process of research	**Elements of quantitative research**
- understand meanings individuals give to a phenomenon inductively	Intent of Research	-Test a theory deductively to support or refute it
-Minor role Justifies the problem	How literature is used	-Major role -Justifies problem -Identifies questions and hypothesis
-Ask open-ended questions -Understand the complexity of single idea (or phenomenon)	How intent is focused	-Ask closed-ended questions -Test specific variables that form hypotheses or questions
-Words and images -From a few participants at a few research sites -Studying participants at their location	How data is collected	Numbers -From many participants at many research sites -Sending or administering instruments to participants
-Text or image analysis -Themes -Larger patterns or generalisations	How data is analysed	-Numerical statistical analysis -Rejecting hypotheses or determining effect sizes
-Identifies personal stance -Reports bias	Role of the researcher	-Remains in background -Takes steps to remove bias
-Using validity procedures that rely on the participants, the researcher or the reader	How data is validated	-Using validity procedures based on external standards, such as judges, past research, statistics

(Source: Creswell & Plano Clark, 2007)

In quantitative studies the literature review establishes the importance of the purpose of the research problem, and helps identify a theory to test, or a specific problem that

remains unanswered in the literature. Furthermore, literature in quantitative studies is used to define questions to focus the study and advance the research.

Open-ended questions are used in qualitative research to explore the research problem, while quantitative studies make use of closed-ended questions.

There is also a variation in the type of data collected and how analysis is undertaken. The emergent nature of qualitative research provides rich 'context-specific' information, usually in the form of textural descriptions, which are then processed to explain the phenomenon being studied. Data collected from quantitative studies are usually numbers or scores. These scores and numbers are statistically analysed and the findings either reject or support a claim or theory. A researcher brings to a research certain personal experiences and values that shape the outcome of the research. This makes the role of the researcher a very important factor to consider in research design. These roles vary in both qualitative and quantitative studies.

Quantitative studies are designed to eliminate researcher influences on the results of the study (even though there have been arguments that eliminating researcher influences completely from research cannot be achieved). As a consequence, the researcher remains in the background and findings are judged on for example, the basis of the test content, theoretical and empirical analysis of the response processes of test takers, the relations of test scores to variables external to the test, and the intended and unintended consequences of test use (Creswell & Plano Clark, 2007). A qualitative researcher introduces bias through the way interpretations and coding is done (Creswell & Plano Clark, 2007). This introduces scepticism about the findings of most qualitative studies. Advancements have been made, in that qualitative researchers have now introduced steps to reduce both researcher and respondent bias in the research process. Validity procedures are applied to reduce the threats to internal, construct and external validity that might render the results useless.

4.4 Mixed Methods: Is it a Legitimate Research Methodology?

Many researchers are impervious to persuasions that the different philosophical assumptions provide the foundations for methodological approaches. The debate

concerns whether or not quantitative and qualitative data could be combined. Some argue that mixed methods research could not be justified because the approach suggests a combination of methodological approaches. There are still qualitative researchers (known as *purists*) who avoid using mixed methods research (Creswell & Plano Clark, 2007). *The 'situationalists'* adapt their methods to the situation, and '*pragmatists*' believe that multiple methodological approaches can be used to address research problems.

Mixed method is a methodology (Tashakkori & Teddlie, 1998; Easterby-Smith et al. 2008), even though it is suggested that instead of thinking of the approach as a methodology, greater emphasis should rather be put on the techniques or methods for collecting and analysing data (Tashakkori & Teddlie, 2003; Onwuegbuzie & Teddlie, 2003). Mixed methods research is a type of research methodology with philosophical assumptions as well as methods of enquiry (Creswell & Plano Clark, 2007). The methodological component involves philosophical assumptions that guide the data collection and analysis, and research outcome validation. The approach focuses on collecting, analysing, and mixing both quantitative and quantitative data in a single study or a series of studies. This method may draw from within methods approaches such as different types of quantitative data collection strategies (e.g. a survey-based questionnaire and an experiment), and qualitative data collection procedures (e.g. in-depth interviews).

Even though the worldview debate is far from coming to an end, and the idea of reconciling methodological approaches still exists, mixed methods as a methodological approach has gained legitimacy, and pragmatism is proposed as the best philosophical position to adopt for mixed methods research (Creswell & Plano Clark, 2007).

4.4.1 Mixed Methods Strategy

A variety of mixed method designs and classifications exist (Tashakkori & Teddlie, 2003; Creswell & Plano Clark, 2007), depending on the different social science disciplines available. These include triangulation design, embedded design, explanatory design and exploratory design (see Table 4-3). Each of these types has

variants and conditions under which they could be employed. Triangulation is the most common type. The approach obtains different but complementary data on the same topic to better understand the research problem. The embedded design uses one type of data to provide supportive and secondary role in a study based predominantly on the other data type. It is used on the basis that one type of data is not sufficient in itself to address all the research questions of interest. The explanatory design uses a two-phase approach and suggests that qualitative data helps explain or build upon initial quantitative results.

Table 4-3: Variants of mixed method approaches

Design Type	Variants	Timing	Weighting	Mixing
Triangulation	-Convergence -Data transformation -Validating quantitative data -Multilevel	Concurrent: quantitative and qualitative at the same time	Usually equal	Merge the data during the interpretation or analysis
Embedded	-Embedded experimental -Embedded corelational	Concurrent or sequential	Unequal	Embed one type of data within a larger design using the other type of data
Explanatory	-Follow-up explanations -Participant selection	Sequential: quantitative followed by qualitative	Usually quantitative	Connect the data between the two phases
Exploratory	-Instrument development -Taxonomy development	Sequential: qualitative followed by quantitative	Usually qualitative	Connect data between the two phases

(Source: Creswell & Plano Clark, 2007)

The approach begins with the researcher collecting and analysing quantitative data and subsequently qualitative data. Because the initial phase collects quantitative data, investigators typically place emphasis on the quantitative phase; however, this is not always the case. The last type of mixed method is the exploratory design. This is also a two-phase design, beginning with a qualitative phase and subsequently a quantitative

phase. The design is based on the premise that an exploration is needed for several reasons (e.g. variables are unknown, and there is no guiding framework or theory) and typically begins with qualitative data.

Each of the mixed method designs discussed above has variants. A decision to use a particular variant is made by considering three major factors:

- the timing of the use of data collected (either quantitative or qualitative data would be used sequentially or concurrently);
- the relative weight or emphasis given to one approach over the other and;
- the way data is mixed.

4.5 Philosophical Position and Research Approach Selected

The nature of the research problem, the aim and intent of the research are important factors in deciding how the research should be executed. The aim of the research as discussed in the introductory chapter (section 1.7) is to understand the practice of developing food safety capability to enhance access to the global food manufacturing value chain (GFMVC), using high value-added products. The primary intent was not to deductively test a theory or even develop a theory, but to draw on existing experiences of countries (from the meaning chain participants' offer) in relation to approaches to developing food safety capability to enhance access to the GFMVC, while taking into consideration the unique contextual situations within country contexts.

On the basis of the theoretical discussions in section 4.2, a pragmatist philosophical position was adopted because insight was to be developed using experiences from a working system and one that is not working optimally. The use of a pragmatist's philosophical stance implicitly suggests that a mixed method approach was adopted. The research, hence, combines singular and multiple realities (ontology); in that, the reality of the study as much depends on the initial quantitative testing of a hypothesis (singular reality) as well as on the responses or perceptions of individuals from the perspective of the researcher, reader, and the given situation (hence multiple realities). These perspectives change over time, making use of the present interpretations of participants and the existing context in a particular time. In view of

this, the onus is on the researcher to report these realities faithfully. Additionally, the design of the study incorporated procedures that minimise bias and enhance accuracy and quality of the study.

The nature of the research problem warrants a multi-phase approach, and the inclusion of both qualitative and quantitative data. This was because of the origins of the research problem. The study began with an initial idea which was gathered from:

1. The trends of food exports in Ghana (exports were significantly dominated by raw commodities);
2. Industry's perception of why manufactured products of Ghanaian origin do not make it to the international market. According to industry, manufactured food products of Ghanaian origin did not meet the level of quality and safety prescribed by international markets, and hence a greater percentage of the raw produce were easier to get across to international markets. This limits participation in the global food economy through high-value processed foods;
3. What government thought was the way forward for participating in the global economy (i.e. adding value to raw commodities).

To better understand the current situation of Ghana and her prospects of accessing the GFMVC, the author required an appreciation of the global context within which enterprises may be integrated. The findings of the initial investigation suggested that the phenomenon of non-compliance with international food safety requirements was a major as well as a basic issue to be addressed. Consequently, the research proceeded to validate the research problem (the phenomenon of non-compliance with international food safety requirements among indigenous food manufacturers), using insights (mainly on requirements of the GFMVC) and tools developed from the initial literature investigation. Because a single indicator could not be used to establish the phenomenon of non-compliance with international food safety requirements in the Ghanaian manufacturing context, other means had to be sought. The researcher decided that an objective and more accurate way of establishing the phenomenon of interest would be to use a tool that requires enterprises to indicate their own compliance levels, and the responses subjected to an objective analysis in order to

generalise to the population of interest, before further investigations are conducted to better understand the elements working together to produce that outcome.

This research problem clearly required a methodological approach that could accommodate both quantitative and qualitative data, and the mixed methods approach provides the framework for it. The study, hence, accepts both the notion that what we know (epistemology) can be measured objectively and can also depend on the meanings respondents give to the phenomenon (subjective). This study, thus, combines both notions, making use of the positivism stance on epistemology in the quantitative phase and the constructivism stance on epistemology in the qualitative phase of the enquiry. Multiple stances (both biased and unbiased) are accommodated by this worldview (axiology).

From the foundational discussions in section 4.4.1, the design type and variant thought to be appropriate for this study was '*explanatory design-follow-up explanations model'*. The design used one research methodology (quantitative) sequentially, to develop, validate and focus the research problem, after which a qualitative methodology was used to execute the remaining part of the research. The quantitative approach is the less dominant, and the qualitative approach is the more dominant. In order words, greater emphasis is laid on the qualitative methodology than on the quantitative methodology. Data from the quantitative and qualitative phases are used in a connected manner.

Figure 4-1 highlights in the decision tree, how the three main criteria influencing the choice of a mixed method design have been used to facilitate the choice made for this study (highlighted in violet). By using both quantitative and qualitative approaches in the same study, the weaknesses purported as inherent in using either approaches[14] (Creswell & Plano Clark, 2007) are compensated for, yielding a more robust approach.

[14] Quantitative research is said to be weak in understanding the context or setting in which social interactions take place, and the voice of participants is not directly heard; on the other hand qualitative research is also seen as deficient because of the personal interpretations (biases, subjectivity and influenced by the value of the researcher) made by the researcher, the difficulty in generalising findings to a large population.

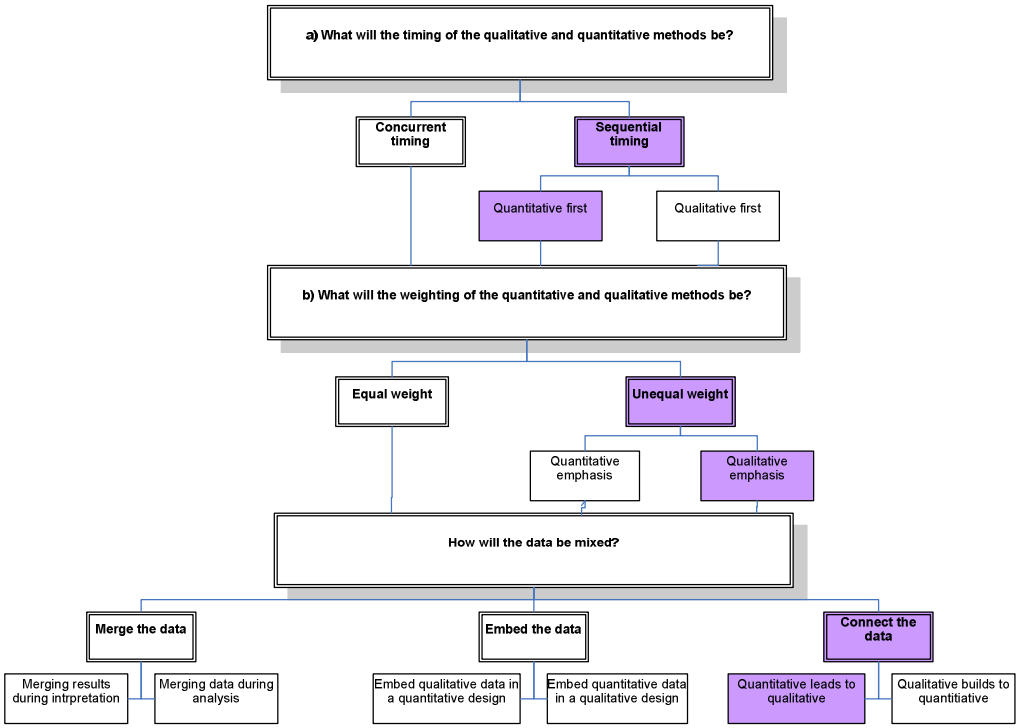


Figure 4-1: Decision tree for mixed method approach selected

(Source: Adapted from Creswell & Plano Clark, 2007)

4.6 Research Strategy

Some researchers (e.g. Guba & Lincoln, 1994) have emphasized that research designs are of secondary importance to worldviews, however others continue to link specific paradigms with specific research designs. Quantitative designs include surveys and experiments (Robson, 2002). On the other hand, qualitative designs include a wider range of approaches (Creswell et al., 2003). The purpose of this section is not to discuss available research strategies but to give an overview of a select few that may have relevance for this study.

Yin, (2009) sets out conditions under which certain types of research designs or methods could be employed (Table 4-4). These conditions were consulted to facilitate the choice of research methods suitable for this study.

Research that makes use of 'how' or 'why' questions could be suitable for both experiments, histories and case studies, however, when the researcher has control over behavioural events and the research addresses a contemporary issue or event,

the most appropriate research design to adopt is experiments. In the event that 'how' and 'why' questions are being pursued, and there is no control over behavioural events and a contemporary issue or event is being investigated, then case study design is the most appropriate approach. Histories are most suitable when the issues or events of interest are not contemporary and the researcher has no control over behavioural events or issues. In the second instance, where 'what', 'who' and 'where' or their derivatives are being posed as primary research questions, a survey method or the analysis of archival data are more favourable. These methods help to describe the incidence or prevalence of a phenomenon or when it is to be predictive about certain outcomes. However, there are some 'what' questions that are exploratory. Under such circumstances, either of the research design approaches mentioned in Table 4-4 could be useful.

Table 4-4: Relevant situations for different research methods

Method	Form of research question	Requires control of behavioural events?	Focuses on contemporary events?
Experiment	How, why?	Yes	Yes
Survey	Who, what, where, how many, how much?	No	Yes
Archival Analysis	Who, what, where, how many, how much?	No	Yes/no
History	How, why?	No	No
Case Study	How, why?	No	Yes

(Source: Yin, 2009)

4.6.1 Case Study Strategy

The case study is a separate research design approach (Yin, 2009), even though there has been earlier suggestions in some research books of the approach being a technique for data collection. Case studies are particularly useful when enquiring into a phenomenon in its natural context (Yin, 2009). The case study approach facilitates

understanding of issues within the case, for gaining insight into the interactions and relationships that influence the case, and for interpreting the social mechanisms that are important to the issues being studied (Stake, 1995). There are a variety of case types available. Four major types are relevant: single-case or multiple-case designs, and holistic or embedded case designs (Yin, 2009). See Figure 4-2 for an overview.

The decision to choose either a single or multiple, holistic or embedded case depends on the rationale for the study. A single case may be chosen on the basis that it is a unique/extreme case, critical case or even a typical case. In a multiple circumstance, two or more cases could be selected with the intent to investigate, confirm or challenge a proposition.

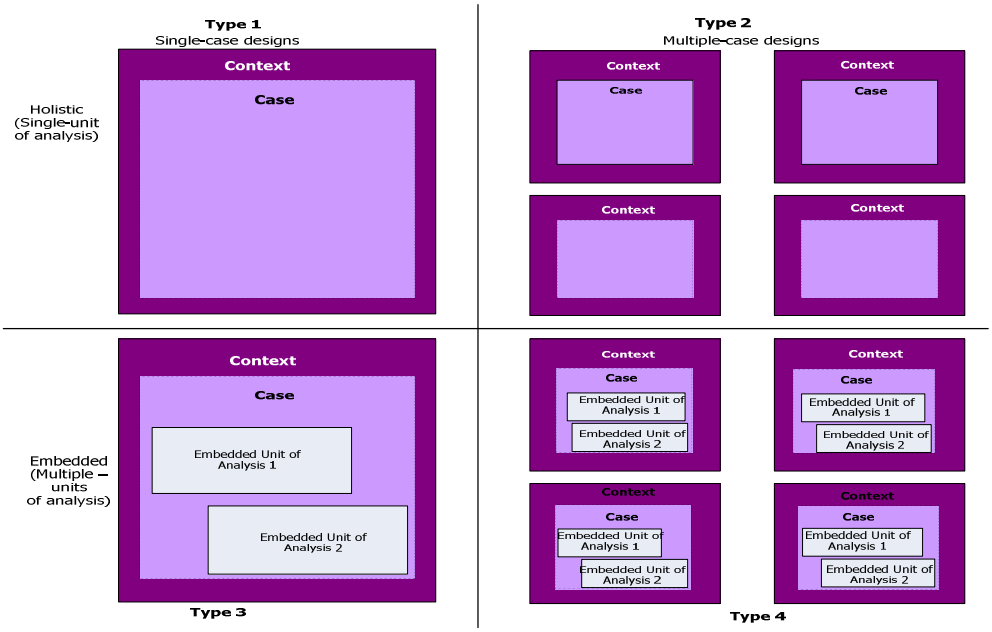


Figure 4-2: Case study types

(Source: Yin, 2009)

Choosing an holistic or embedded design particularly depends on the number of unit(s) of analysis. The primary unit of analysis is also dependent on the definition of the primary research question. If there are sub-units of analysis within the primary unit of analysis, an embedded design is appropriate. However, in the event that the global nature of an organisation or programme is being considered, then the appropriate design is holistic. It is important to distinguish the participants to be included in the unit of analysis and those who are outside it (the context of the case study) (Yin, 2009).

Explicitly stating the context helps to scope the study and prevent spending scarce resources to collect data that is not relevant to the study.

4.6.2 Survey Research

Survey approaches are particularly suited to research problems when the researcher aims to describe the prevalence of a phenomenon or when there is the need to be predictive about an outcome. The approach allows for the drawing of a sample from a population of interest, with the aim of generalising to the final population (Easterby-Smith, et al., 2008). Sampling presents a cheaper as well as a quicker and more feasible way of gathering information about a phenomenon (Lucey, 1996).

Table 4-5: Sampling strategies

Sampling approach	Technique	Application
Systematic sampling	A starting point is randomly selected, after which a sample item is selected every nth term	Often used in production and quality control.
Stratified sampling	Population is divided into strata and random samples are then taken from each strata	Used when the population can be divided into sub-groups or strata
Multi-stage sampling	Similar to stratified sampling. The point of distinctions that stratification is done on the basis of geographical location	Used to reduce travel time of interviewers and subsequent costs
Cluster sampling	A few geographical areas are selected at random and every single element in that area is interviewed	Useful for dealing with lack of satisfactory sampling frame
Quota sampling	The quota is divided into various categories and interviewer selects on the spot up to the quota required	Useful when resources are limited

(Source: Lucey, 1996)

In order to avoid researcher bias in sample selection, and to ensure that a representative sample is selected, random sampling approaches are preferred. In this type of sampling, every item of the population has an equal probability of being selected. Even though simple random sampling is rarely used alone in sample selection, it is the basis for more sophisticated sampling systems (see Table 4-5).

4.6.3 Research Strategy Selected

The aim of the research reflects an interest in how countries and their food manufacturing enterprises develop food safety capability to enhance their access to the global food manufacturing value chain, through enhanced food safety capability. A case study methodology was deemed appropriate because the inclusion of contextual factors were essential for a critical analysis of the phenomenon (food safety assurance) under study (Yin, 2009). Furthermore, from the guidelines provided by Yin (2009), a case study strategy is selected as appropriate.

A multiple case study design was chosen so that the phenomenon could be explored in more than one context. The two primary cases chosen were the Ghanaian food manufacturing sector and the UK food and drinks sector. The rationale for selecting these cases was guided by insight gathered from Merrian, 1988; Yin, 2009; Denscombe, 2010:

***Rationale for the Ghanaian food manufacturing sector**:* Firstly, the case was selected because the author was particularly interested in it. Secondly, it is a typical case of food safety assurance in most developing countries, and therefore, the findings of the case study are likely to apply in other developing countries. It also provides a case with a different context to the second case within which to verify the research proposition in section 1.6.

Rationale for choosing the UK food and drinks sector: The UK case was selected on the basis of pragmatism. Evidence available suggests that it is a system in which a technical regulation of food safety (based on integrated approaches) has been implemented to enhance compliance with food safety requirements and access to the GFMVC. As mentioned earlier, the context of this case is also different (it is a developed country) to that of Ghana and hence provided a good context within which to verify the research proposition.

Because the UK is part of the European Union, and all Member States subscribe to similar mechanisms for food safety assurance, an understanding of how the phenomenon takes place in the UK is potentially an understanding of about 27 other

countries. Furthermore, the UK case was convenient in terms of proximity and ease of access to data.

The existence of contextual differences between the two cases chosen, instead of serving as a limitation or flaw, rather provides an excellent case of a working and a non-working system to learn from. Furthermore, by using two cases, a more robust approach and compelling evidence is provided (Creswell & Plano Clark, 2007; Yin, 2009).

From the aim of the research, it is deduced that the unit of analysis is the *'food manufacturing sector',* which is contained in a food industry (context of the case). Within the primary unit of analysis are several smaller units (key stakeholders along the global food industry value chain), which have a stake and a responsibility in the process of developing capability to enhance access to the GFMVC, and hence are also of interest in this study (Figure 4-3 illustrates this). As a result, the embedded case study type is adopted.

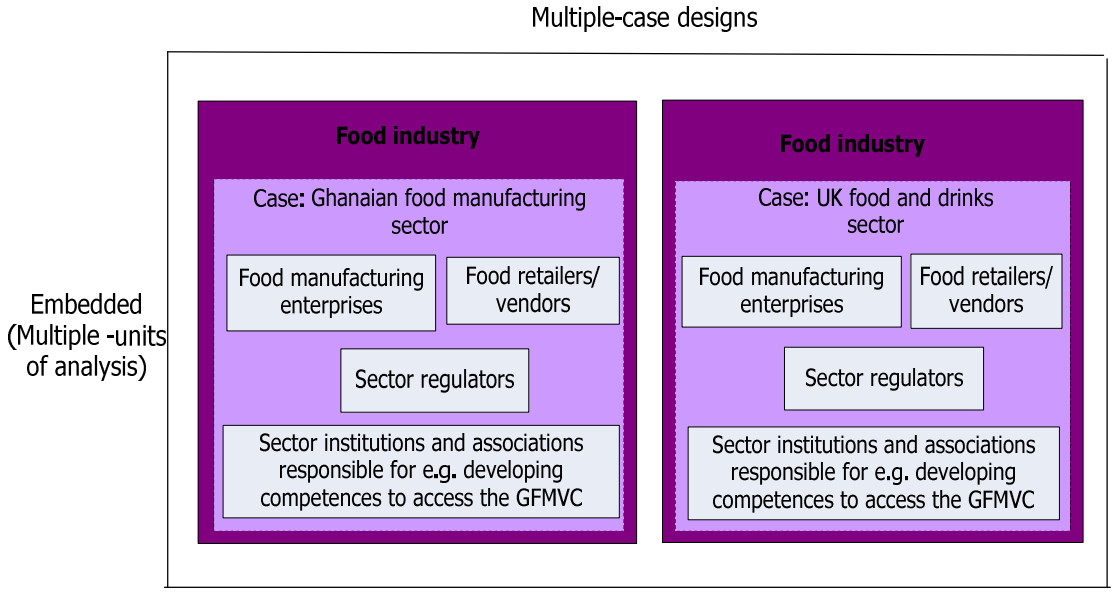


Figure 4-3: Case study types adopted

(Source: adapted from Yin, 2009)

It must be noted here that a multiple case study is adopted at two levels: first at the country level, and within each country of interest, multiple cases are selected from the different institutional groups relevant to the study.

Within each country case, a survey is also used to investigate food manufacturing enterprises. The details of the designs are contained in the chapters dedicated to the specific country cases.

4.7 Data Collection

The choice of specific research strategies often implies that certain specific techniques for data collection will be used. For example, surveys tend to be linked with questionnaires. The selection of methods is influenced by research strategy, but it is also influenced by the preferences about the kind of data the researcher is interested in and the appropriateness of the method in practice (Robson, 2002; Denscombe, 2010).

The data collection techniques adopted for this study include survey-questionnaires, interviews, and mining of archival records. These techniques were selected because of the nature and kind of information sought and the advantages each brings to the research.

4.7.1 Survey-questionnaires

A variety of modes are available for administering questionnaires to research participants. These include interviews, telephone surveys, online and self-administered postal (mail) questionnaires (Robson, 2002). Self-administered and online surveys were employed in this study to systematically collect data, which is quantifiable in respect of a number of issues relevant to developing food safety capability to the GFMVC and food safety management by enterprises. The details and circumstances surrounding the choice of a particular type of method for administering questionnaires will be discussed in the relevant chapters.

4.7.2 Interviews

Interviews are a common technique for collecting data in most qualitative research, even though the approach can also be employed in quantitative research. Interviewing as a technique for data collection is often classified as structured (using closed-ended

questions), semi-structured (using open-ended questions) and unstructured (using non-direction), (Tashakkori & Teddlie, 1998; Denscombe, 2010). Other classifications include face-to-face interviews or telephone interviews. Both face-to-face and telephone interviews were used in this study. This was because some respondents agreed to participate on condition of flexibility (using either face-to-face or telephone interviews as it suited the respondent). Both approaches were facilitated with the use of a semi-structured interview script and a recorder. The face-to-face interviews and telephone interviews afforded the researcher the opportunity of clarifying questions respondents did not understand. Generally, open-ended interviews allow respondents a degree of control over how they answer questions and how much detail they provide, however, in the case of this study, this advantage could not be fully harnessed, as the researcher was under pressure to conduct some interviews within a limited amount of time. Hence the researcher had to strictly control the scope of responses to ensure that all the areas of interest are addressed within the given time.

There were a number of challenges in using interviews for data collection. Notably amongst them were the costs in terms of the time of the interviewer. There were instances in which the researcher had to travel for more than six hours for a forty five minute interview. Furthermore, transcribing the recorded interviews were time consuming. The details about the interview scripts used, who was interviewed and how many people were interviewed are discussed in the relevant chapters.

4.7.3 Archival Documents

Documents are sources of data in their own right, comparable to the data generated by interviews and questionnaires (Denscombe, 2010). Documents can be very useful in providing answers to questions of interest, particularly, in circumstances where the phenomenon of interest has developed over a long period of time, and has involved process owners who may not be available at a future time. This was the case for food safety assurance in the UK food and drinks sector. The mechanisms and institutional frameworks have evolved over many years, and current regulators could not provide an accurate account of the transitions food safety assurance had gone through.

Therefore, archival documents were the best practical alternative. In the case of Ghana, even though there had been little reform in the mechanisms for assuring food safety, the institutional frameworks for food safety assurance had changed over time, and current regulators could also not give an accurate account of these changes. At the same time, the food safety assurance process was not adequately documented and hence documents (exceptions apply to legal texts) played a limited role.

The greatest advantage with documents is probably their accessibility, which is often relatively easier. However instances occur in which access is deliberately restricted or limited, until negotiations with the holders are complete. In other circumstances, such data are considered sensitive and confidential, and hence the researcher may face difficulties trying to access them. Because the UK regulator operates an open system, and therefore most documents are published, it was not difficult to access them. The case was different in the Ghanaian context, where it was necessary to get authorisation before access was granted to key documents relevant to the research. Using archival documents was a huge advantage, particularly in the UK, because documents could be accessed at a time convenient to the researcher and without any delays.

The validity and reliability of archival documents are often called into question because of uncertainties concerning authenticity and credibility. It was therefore important for the researcher to evaluate the sources of the documents used. The authenticity and credibility of documents were ensured by selecting and using documents from sources recognised as having relevance for the issues of interest to this study, and sources for which statutory powers have been delegated.

4.8 Data Analysis

The logical next step once data is collected is data analysis. The nature of the data collected in this study warrants the use of both quantitative and qualitative analytical techniques. The details of the analytical techniques used for the different cases are discussed in the relevant chapters. This section gives an overview of the generic methods and their application.

4.8.1 Quantitative Analysis

It is a tradition in fixed designs that all the data required in a study are gathered in before analysis begins (Merriam, 1988; Robson, 2002). Descriptive and inferential methods are two major strategies for analysing quantitative data (Tashakkori & Teddlie, 1998). These two techniques were used for the analysis of the quantitative phase of the study. Descriptive analyses seek to summarise data using simple statistics and graphical displays (e.g. measures of central tendency), which help the reader to understand the nature of the variables and the relationships amongst them. For most research purposes, descriptive approaches may not be enough for estimating and generalising to populations. Inferential methods have the capability to accomplish estimations and testing of hypotheses (Lucey, 1996; Blaikie, 2003) and hence are the preferable methods for analysis in such circumstances. Inferential analysis is based on estimations of how much error is involved in obtaining a difference between groups or a relationship between variables. And this allows researchers to explain events or establish causation.

4.8.2 Qualitative Analysis

Case studies do not call for a particular approach to data analysis (Robson, 2002), as the account often gives details of the approach to analysis that is adopted. There is no set time for starting the analysis of data generated by flexible designs; an early analysis is however recommended by Miles & Huberman (1994) as emerging insights direct the subsequent phases of the research. This in turn informs further refinement or reformulation of set questions and propositions. Qualitative case studies generate an enormous amount of textual data, and this can overwhelm the inexperienced researcher and even sometimes, the experienced researcher (Yin, 2009). The data, if in recorded format, will have to be transcribed; all forms of qualitative data have to be reduced, displayed, conclusions drawn and verification made (Miles & Huberman, 1994) at various points.

Because of the multiplicity of cases used, two main case study analytical techniques were used; namely within-case analysis and cross-case analysis. Sections 4.8.2.1 and 4.8.2.2 will gives an overview of these techniques.

4.8.2.1 Within Case Analysis

A combination of both exploratory and explanatory within-case analysis was conducted. This was because the researcher was interested in knowing what had gone on in the two main cases with regards to food safety assurance, how it was implemented, and what explains the current levels of food safety observed in each case. Within case analysis usually involves coding the data, developing categories, typologies or theories and identifying trends emerging from the data.

This study considered each enterprise represented by a respondent as a case. Because the researcher had some underlying themes in the interview script, these were used as the descriptive framework outlined in excel, under which the data collected were organised. The analysis within each case involved identification of obvious keywords across the different respondents within the different institutional groups that participated, and the development of conceptual categories that interpreted the data (as opposed to using codes) and provided answers to the research questions. The development of categories, themes and trends was intuitive in some cases after interviewing a number of respondents, but in other cases it was marked with great difficulty.

Because the interest of this study was not so much about developing or testing a theory but to capture the nature and range of issues that arose in the particular contexts, instances occurring in particular cases also played a significant role in understanding the complexity of food safety assurance.

4.8.2.2 Cross-case Analysis

Within each country case, a cross-case analysis was undertaken both as a way of triangulating certain responses and using information from the different respondents to complement each other to better understand the case study.

At the country level, a cross-case analysis was also conducted. According to Miles & Huberman, (1994), the use of multiple cases facilitates both generating explanations, and testing them systematically; it is also a good way of testing ideas about how a particular phenomenon works in the social context. Case studies are selected because of an interest in understanding a phenomenon in an holistic manner (Merrian, 1988).
In principle, many of the techniques applied in a within case-analysis can be applied in a cross-case analysis. A cross-case analysis allows the researcher to further develop higher-level, overriding conceptualisations that elaborate the data. Furthermore using cross-case analysis helps to make a strong case for refuting or confirming a proposition or theory. The researcher hence builds a general explanation that fits each of the individual cases involved, regardless of the variation in contexts (Yin, 2009).

4.8.2.3 Content Analysis

Content analysis is a legitimate approach to data analysis. The technique is used to examine data, printed matter, images or sounds (texts) in order to understand what they mean to people, what they enable or prevent, and what the information conveyed by them does (Krippendorff, 2004). According to Krippendorff (2004), these are questions for which other scientific methods have no answers and for which their methods are generally insensitive.

Content analysis utilises a set of procedures to make valid (Weber, 1985) and replicable inferences (Krippendorff, 2004). The approach provides new insights, increases a researcher's understanding of particular phenomena or informs practical actions (Krippendorff, 2004). The content analysis technique has in the past been limited to textural material (Neuendorf, 2002). However, this limitation must not necessarily exist, as content analysis can be applied to other materials (e.g. art, maps, signs and even numerical records) provided they communicate to the researcher about phenomenon outside of what can be sensed or observed (Krippendorff, 2004). The technique can be applied, in a variety of areas (e.g. the study of beliefs, attitudes, human relations (Woodrum, 1984)), and to individuals, groups and even organisations.

Content analysis focuses on, the content of the message rather than on the characteristics of individuals or groups, the significance and interpretations of the findings (Krippendorff, 2004). As a result, adductive inferences are central to the technique, with inferences made from the data (e.g. text, images and maps) to answer the questions of interest to the researcher. The technique has the capability of allowing past happenings to be comprehensible in the present through inferences from documents that have survived to the present (Dibble, 1936, as cited by Krippendorff, 2004).

The advantages of the technique include among other things, the fact that it yields unobtrusive measures in which neither the sender nor the receiver of the message is aware that it is being analysed. However, to draw valid and reliable inferences (Weber, 1985; Neuendorth, 2002; Krippendorff, 2004) from the text, quality checks must be incorporated in the process of analysis. This suggestion is consistent with quality checks undertaken as part of other qualitative research techniques (see e.g. Yin, 2009).

4.9 Development of Research Programme

The aim of the study as captured in section 1.7 is to understand the practice of developing food safety capability to enhance access to the global food manufacturing value chain (GFMVC), using high value-added products. To realise the stated aim, a research programme was devised to guide the activities of the research in a sequence of phases. This section gives an overview of the phases, links them to the methods chosen and gives details of data and information needs. Furthermore, details relevant to associated chapters of the phases are provided.

4.9.1 Structuring Overall Research Programme

The research relies on real practice, i.e. the case of a system which is flawed, with regards to the development of food safety capability to access the GFMVC, and a 'working system'. While it was important to learn from the approaches of other countries, it was also recognised that the lessons learned may not be directly replicable, or models that have worked in other countries may not necessarily work

appropriately in different contexts. This is because of the different political, social and economic circumstances prevailing in each particular context. A better approach was, hence, to conduct the analysis of the sector of interest from first principles, to understand the dynamics involved with the application of the variety of legal, institutional and policy frameworks available and how they are applied in different contexts (Ehrhardt et al., 2007). With this approach, the lessons learnt from other countries could be tailored, keeping in mind the unique contextual factors that influence the capability of a country (and an enterprise) to assure safe food in the GFMVC.

4.9.2 Overview of Research Phases

The research is structured into four main phases to correspond with the research objectives outlined in section 1.7.

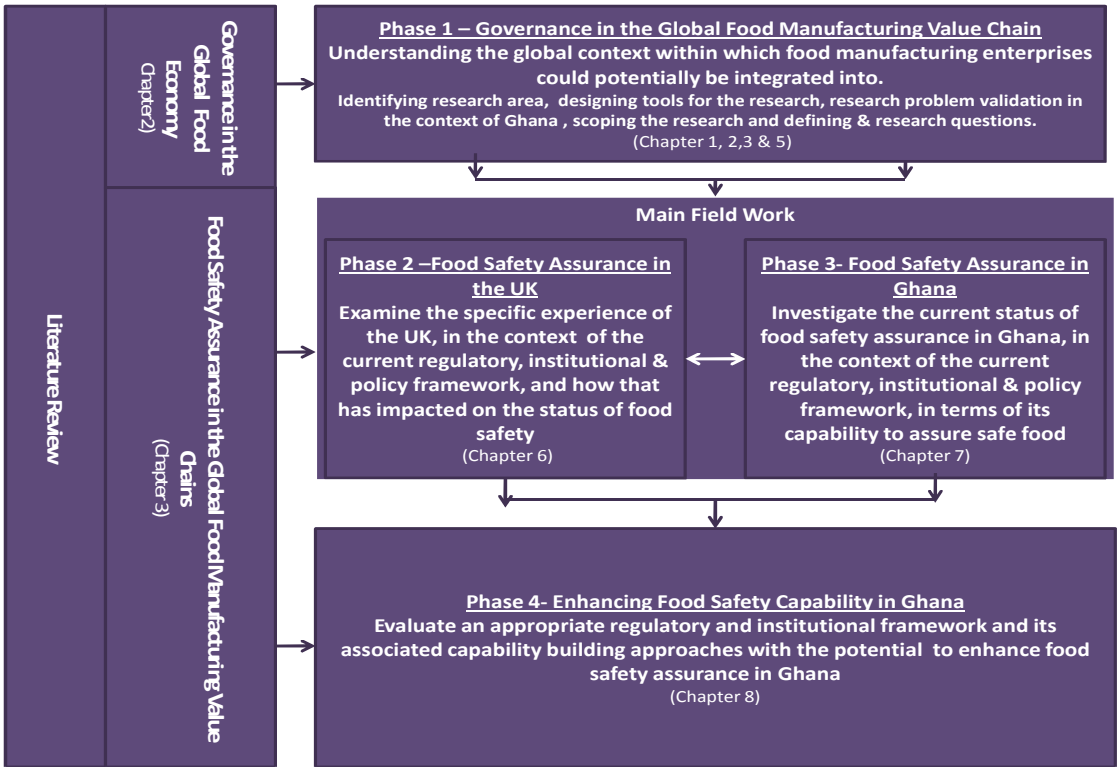


Figure 4-4 : Research programme

Figure 4-4 gives an overview of the research programme, linking the different phases with the chapters in which the details are contained, and describing how the different phases link together.

4.9.2.1 Phase 1: Governance in the Global Food Manufacturing Value Chain

The purpose of this phase was to achieve objective 1; which was to understand the global context within which enterprises may be integrated into and their implications for developing countries accessing such chains. Knowledge of the structure of the GFMVC, the stakeholders and their roles, as well as governance structures characterising the chain played a significant role in achieving the objective of this phase.

Techniques used for this initial data collection were literature review and mining of archival data, in the form of global agreements governing international trade and food safety in particular, and private standards applicable to food manufacturing enterprises. The insights developed from the literature review and mining of archival data helped to develop tools for validating the research problem. The research problem validation made use of a self-assessment survey-questionnaire developed from literature and the requirements of the ISO 22000 international food safety standard, administered to food manufacturing enterprises, to ascertain their status with both domestic and international food safety requirements.

The outputs of this phase were an understanding of the structure of the global food manufacturing value chain and how it is governed, the relevant chain participants, the factors that influence their decision-making processes concerning integrating prospective actors, and the definition of the relevant concepts to focus on in the subsequent phases.

4.9.2.2 Phase 2: Food Safety Assurance in the UK

This phase addressed objective 2. The primary mechanism for assuring safe food in the UK was identified from literature and from interviews. Archival records on the content of legal and regulatory frameworks, organisational arrangement and operational processes, as well as the impact of mechanisms employed on the status of food safety was collected and analysed. A survey-based methodology was used to gather information on the best practices associated with translating integrated food safety requirements into actions on the shop floor. The perceptions of quality managers and

technical directors were explored on the effects of the mechanisms and institutional arrangements in place on the assurance of safe food and on their compliance. They were also asked about what alternative mechanism could have achieved the same outcome achieved by current mechanisms. Data on how the sector is coordinated to provide the necessary capability to comply with food safety requirements was also collected from different institutional groups.

From Yin's, (2009) suggestions for choosing a type of research design (Table 4-4), a case study methodology was most suitable for this phase of the study because it is particularly useful when pursuing a study requiring a detailed understanding of a social or organisational process, and yields rich data which incorporates contextual conditions.

At the end of the phase, best practices in the implementation of an integrated food safety management system were collated. An understanding of the regulatory, institutional and policy frameworks implemented and the response of food manufacturing enterprises is also gained. These pieces of evidence were drawn together and examined in the light of the research proposition in section 1.6.

4.9.2.3 Phase 3: Food Safety Assurance in Ghana

This phase addressed objective 3. The purpose was to investigate the current state of the Ghanaian food manufacturing sector, in the context of its current regulatory, institutional and policy framework, in terms of its capability to assure safe food, and hence enhance access to the GFMVC. Detailed case investigations were conducted with relevant stakeholders to establish their roles in food safety assurance in Ghana. Consequently, information on the current institutional structures, mechanisms and processes for assuring safe food was collected using a case study strategy at the national level. The same method was used to investigate the factors influencing the compliance of food manufacturing enterprises with the basic food safety requirements of food safety at the enterprise level. The data generated from the case study was complemented with information from archival records, particularly legal texts and research reports.

At the end of this phase, the researcher was able to understand the factors working together to limit the compliance of food manufacturers to the GFMVC, and the gaps in institutional frameworks and processes, allowing for the examination of the research proposition (section 1.6) in the Ghanaian context.

4.9.2.4 Phase 4: Enhancing Food Safety Capability in Ghana

This phase addressed objective 4. The aim of the phase was to conduct a cross-case analysis of the findings from the two main cases of interest (Ghanaian food manufacturing sector and the UK food and drinks sector) to identify gaps in the Ghanaian system. The key findings from the case studies is coalesced with the extant literature in food safety assurance to evaluate alternative mechanisms for enhancing compliance with the basic requirements of food safety in Ghana (using the Analytical Hierarchy Process) and propose options to improve the performance gaps identified in terms of the regulatory, institutional and policy frameworks.

4.10 Research Validity and Reliability

Validating a research is a means of demonstrating that the research is accurate or true (Robson, 2002). Four tests have been used to test the quality of social science research (Yin, 2009): construct validity, internal validity, external validity and reliability. Different strategies (Table 4-6) were employed at different phases of the research to ensure its quality and reliability.

Construct validity regards the definition of correct operational measures for the phenomenon under study. Construct validity was applied in phases 1, 2 and 3. The primary phenomenon of interest was how countries and their food manufacturing enterprises assure food safety in global value chains (in other words, their level of food safety capability). There is no direct operational measure for this phenomenon; however, there are elements that demonstrate that a country and its food manufacturing enterprises are compliant with food safety requirements. Countries demonstrate compliance through national institutional structures and the consistency of their manufacturing enterprises to produce high quality safe food. The operational

measure used to estimate compliance with international food safety requirements at the enterprise level is certification; however, this is not accurate as some enterprises may comply with food safety requirements but not get certified. As a result, enterprises were measured against the individual requirements of the ISO 22000 international food safety standard for manufacturers, as it has concepts that are relevant to an integrated process-based approach to assuring food safety in the manufacturing process. An overall quantitative performance rating was then used as a measure of compliance or otherwise with international food safety requirements.

Also, multiple sources of evidence (using certification, interview data, and company reports) and different respondents were asked the same questions from different institutional groups in phases 2 and 3. Hence triangulation was one of the main means of ensuring quality.

Internal validity is used to explain how and why event *x* leads to event *y* (Yin, 2009). Rival explanations were offered to explain the trends of exports of food products in Ghana, and why the phenomenon of non-compliance with international food safety requirements exists in the Ghanaian context, among other things. Furthermore, a case is made for why an integrated food safety approach provides a robust approach to assuring food safety in the GFMVC (and by extension, enhancing access to the GFMVC) as opposed to predominantly performance-based approaches. Internal validity is hence applied in phases 3 and 4.

The external validity test helps the researcher know whether the findings of the study can be generalised beyond the immediate case study environments. In both phases 2 and 3, surveys were used. The aim was first to generalise the practices in the implementation of an integrated food safety management system to the UK food and drinks manufacturers in phase 2, and to generalise the phenomenon of non-compliance with international food safety requirements of domestic food manufacturers in Ghana, in phase 3. The results are presented in Chapters 6 and 7. The gaps identified in the Ghanaian context are specific to Ghana and so are the recommendations. As a result, the study is not claiming external validity. However, if

similar gaps identified in Ghana are identified in other contexts, the proposed initiatives might be useful.

Reliability is demonstrating that the operations of the study (e.g. collecting data, analysing data) if undertaken by another investigator (doing the same case studies again) as described by the researcher, will arrive at the same findings and conclusions. To ensure reliability, a case study protocol and database was used (Yin, 2009).

Table 4-6: Strategies for research validation

Tests	Strategy for validity/reliability	Phase of research in which strategy is applied	Phase of research programme in which strategy is applied
Construct validity	-Use multiple sources of evidence -Establish chain evidence -Have key informants review draft case study report	-Data collection -Data collection -Composition	Phases 1, 2, 3
Internal validity	-Do explanation building -Address rival explanations	-Data analysis	Phases 1 and 4
External validity	-Use replication logic in multiple case studies	-Research design -Research design	Phases 2 & 3
Reliability	-Use case study protocol -Develop case study database	-Data collection -Data collection	Phases 2 & 3

Source: Adapted from Yin, (2009)

4.11 Summary of Methodological Approach

This chapter has given an overview of the philosophical stance that provides the foundations on which this research is hinged, and the associated research strategies and methods adopted for this study. Based on the guidelines provided by Creswell & Plano Clark, (2007), the pragmatist worldview and its philosophical assumptions were selected for this study. Consequently the mixed methods approach was selected as the framework for designing the research because of the nature of the aim and the fact that the research is applied and seeks to propose changes based on what works in practice. The mixed method variant, explanatory, follow-up explanation was selected.

Two research design approaches were adopted: a survey and multiple embedded case study strategies were adopted, of which the two key cases were chosen on the basis of criticality and pragmatism.

A four-phase research programme was developed to address the four objectives outlined in section1.7. A summary of the purpose of each objective, strategies used and outcomes is shown in Figure 4-5).

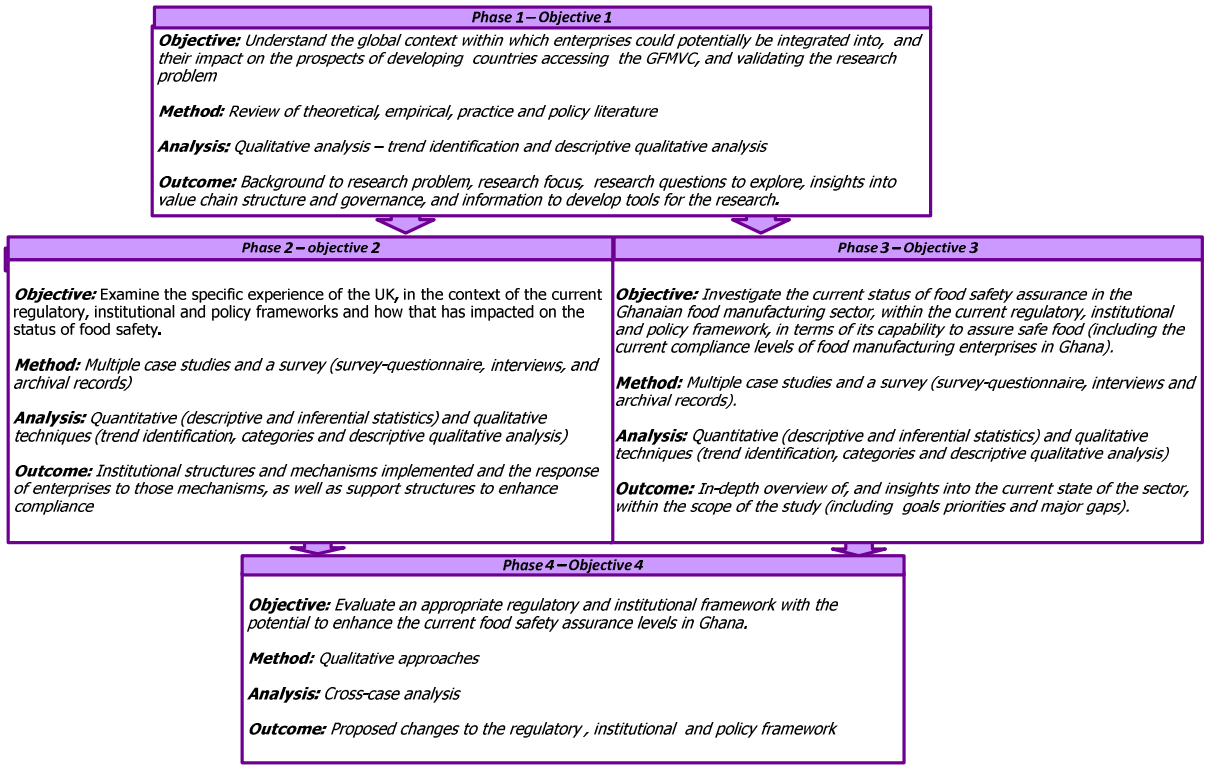


Figure 4-5: Overview of research methodology

CHAPTER 5: VALIDATION OF RESEARCH PROBLEM

The origins of the research problem (see section 4.5) and the lack of evidence to back it prompted the inclusion of this section in the research. The section used empirical evidence to ascertain the current compliance levels of food manufacturing enterprises in Ghana, with the basic international food safety requirements and the requirements in the domestic market. The survey took place between June and September, 2008.

From the literature reviews in Chapters 2 and 3, it was realised that the basic requirements of the international market is compliance with international food safety requirements (see section 2.2.2.1), which has moved from reliance on performance-based approaches to integrated process-based approaches. Hence a globally accepted integrated process-based standard (ISO 22000:2005) was used as the framework of reference.

5.1 Approach

A survey methodology was adopted. The population of interest was all enterprises manufacturing food for human consumption in Ghana. Having access to all such enterprises was not practical, since a universal sample frame was not available. Furthermore surveying the whole population of interest would not have been practical because of costs and time implications, and hence testing a sample was deemed to be a more pragmatic approach.

The primary aim of using this approach was to be able to generalise the phenomenon of non-compliance of domestic enterprises in the Ghanaian food manufacturing sector with international, as well as domestic food safety requirements (Fowler, 2002).

5.1.1 Research Instrument

As mentioned in section 4.5, no single indicator was identified for measuring compliance with international food safety requirements at the enterprise level. Therefore, the survey adapted and used a self-assessment questionnaire, developed by Smith et al (2007), based on the requirements of the ISO 22000:2005 international

food safety standard for manufacturers, to measure enterprises against the individual elements of the standard. The questionnaire required that the technical or quality manager indicated the type of food safety standard their enterprise was certified to, and rated the level of compliance of their enterprise, in relation to the requirements of the standard. A section on enterprise characteristics was included to allow for categorisation of responses (APPENDIX A).

5.1.2 Sample for Survey

The target population of interest was food manufacturing enterprises. An up-to-date universal sample frame was not available; hence the researcher relied on an internal database of the Ghana Standards Board (GSB)[15], which comprised a list of enterprises that were once registered with the Board.

The database from which the sample was drawn did not have the direct contact details (phone numbers and email addresses) of the process owners (quality and technical directors) the research was interested in. As a result the generic phone numbers of the enterprises available on the sample frame was used to contact enterprises to request for email addresses of quality and technical directors so that the link to the online survey-questionnaire could be sent.

Out of the 118 enterprises that were randomly drawn from a stratified sample of food manufacturing enterprises, and invited to participate in the self-assessment survey, 35 responded (see APPENDIX B for letter of invitation). The sample comprised 20 small and medium enterprises (SMEs) and 14 large enterprises[16]. The response rate was approximately 30%.

5.1.3 Analysis

The survey responses were entered into an Excel workbook and descriptive statistics were computed to arrive at a performance rating for each participating enterprise. The performance ratings were categorised into three ranges (Table 5-1). The results were

[15] GSB is the statutory standards development and conformity basement body in Ghana.
[16] One respondent did not indicate the size of the enterprises

further categorised into three groupings, based on higher level themes derived from the elements of the ISO 22000 international food safety standard: requirements for management responsibility, requirements for process management and requirements for resources management.

Table 5-1: Guide to analysis of self-assessment results

Category	Range of Performance Rating	Interpretation
Category 1	23 or less	Do not meet the basic food safety requirements of the international market
Category 2	24-69	Have some food safety management system elements in place, but do not meet all requirements.
Category 3	70-92	Meet the basic food safety requirements of the international market, provided enterprises score 3 or above on individual elements of the standard as well

This was to aid comparison of the different types of enterprises that responded: domestic vs. international enterprises, domestic SMEs vs. international enterprises SMEs, and domestic enterprises vs. international food safety standard.

The average performance rating for domestic enterprises was computed in Excel. Inferential statistical analysis was used to test the null hypothesis that "domestic *manufactured food of Ghanaian origin meets the basic requirements of the international market"*. This is illustrated statistically as shown in Equation 1 & Equation 2 below.

Null hypothesis, H_0 $\mu = 70$ Equation 1

Alternative hypothesis, H_1 $\mu < 70$ Equation 2

The test statistic for one population mean is $Z = \frac{\bar{x}-\mu}{\frac{s}{\sqrt{n}}}$. Equation 3

Where:

$\bar{x}$ is the average performance rating

x is the performance rating of individual enterprises;

μ is the population mean, which is equal to the claimed value μ_0	($\mu = \mu_0$).	Equation 4
s is the sample standard deviation	$s = \sqrt{\sum(x - \bar{x})^2/n - 1}$	Equation 5
n is sample size	n = 16	Equation 6
The number of degrees of freedom is	$df = n - 1.$	Equation 7
The standard error	$= s/\sqrt{n}$.	Equation 8

5.2 Results of Performance Ratings

The responses received from the self-assessment survey indicate that no enterprises fell into Category 1. Category 2 had 21 enterprises, and 14 enterprises fell into Category 3. There were 16 domestic enterprises and 14[17] international enterprises. There were 14 large enterprises and 19[4] SMEs. Table 5-2 gives further details.

Table 5-2: Breakdown of survey responses

Category	Total no. of enterprises in Category	SME	Large	Domestic	International	Domestic certification	International certifications
Category 1	0	0	0	0	0	0	0
Category 2	21	17*	3*	12*	5*	18*	0
Category 3	14	4	10	4*	9*	14	10
Total	**35**	**34***		**30***		**32***	**10****

* Where totals do not agree with overall suggests missing data,**Where totals do not agree with overall suggests no international certifications

From the results, 32 enterprises were compliant with domestic requirements. Three enterprises were registered with the Ghana Food and Drugs Board (FDB) (the institution mandated to regulate manufactured food in Ghana), and 32 enterprises indicated that they were licensed to use the Ghana Standards Board's Certification Market. This number of enterprises included those which were also registered with the

[17] Where sums do not agree with overall total suggests missing data

FDB. Three enterprises had neither domestic clearance nor certifications to manufacture food in Ghana; these enterprises did not also have any international certifications. See APPENDIX C for an overview of the results of the self-assessment survey.

From Table 5-2, it can be argued that:

1. There is significant difference between the requirements of the local market and that of the international market. This is reflected in the fact that even though 18 enterprises in Category 2 had clearance to use the Ghana Standards Certification Mark, those enterprises were not in good standing with international food safety requirements because domestic requirements were predominantly based on product certifications;
2. An enterprise can comply with international food safety requirements without getting certified to any standard. This is reflected in the fact that four enterprises in Category 3 were not certified to any international food safety standards but were in good standing with the basic requirements of food safety;
3. Some SMEs have achieved compliance with the basic requirements of the international market (Table 5-2).

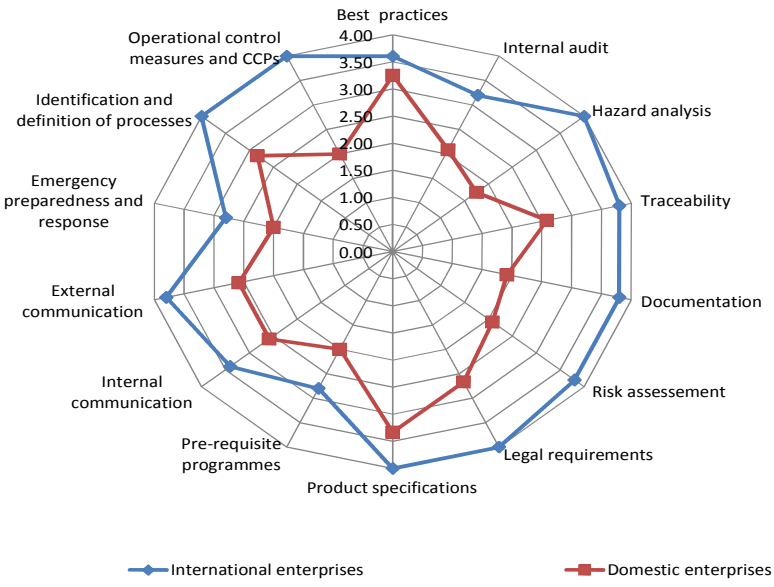


Figure 5-1: Requirements for process management: domestic vs. international enterprises

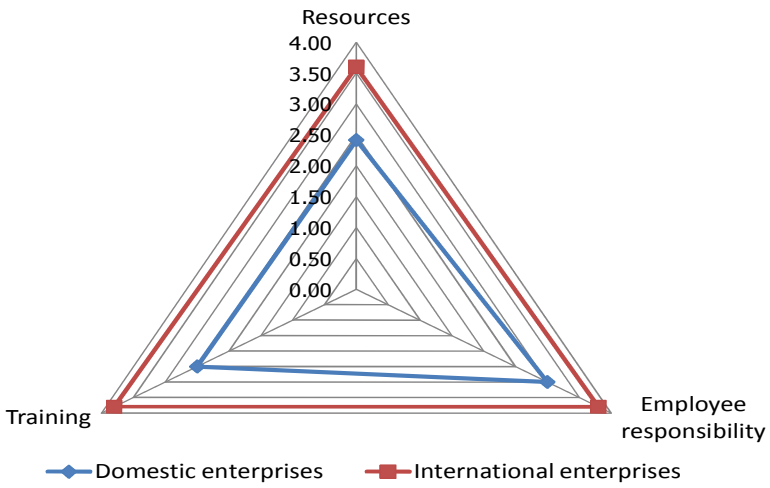


Figure 5-2: Requirements for resource management: domestic vs. international enterprises

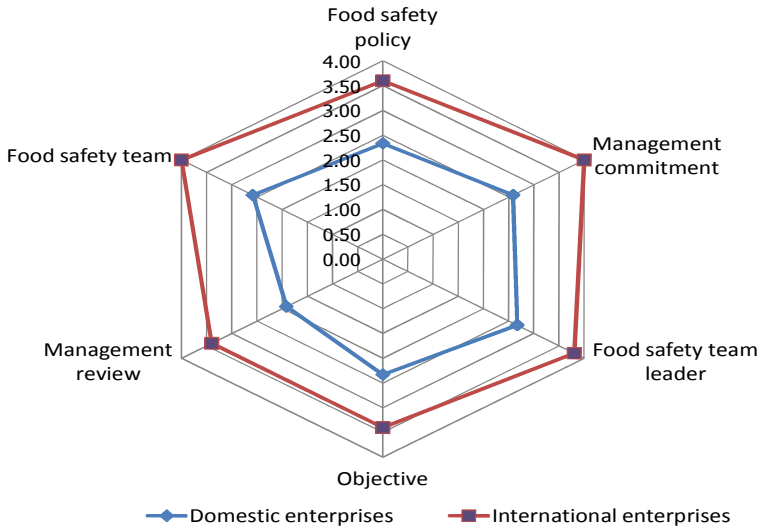


Figure 5-3: Requirements for management responsibility: domestic vs. international enterprises

The thematic categorisation comparing the compliance levels of domestic enterprises with their international counterparts in Category 2 also shows:

Varying degrees of gaps between the compliance levels of local enterprises and their international counterparts, for all three thematic categorisations (Figure 5-1, Figure 5-2, Figure 5-3).

1. It is realised from the charts that the international enterprises performed better on a significant amount of the elements of the requirements for process

management, requirement for resources management and requirements for management responsibility. A significant amount of them had performance ratings above 69 (which means that they were compliant in the first stage), however, in the second stage of analysis, because five international enterprises scored less than 3 on some individual elements, that put them in Category 2. Consequently, international enterprises had a higher performance rating than domestic enterprises (Figure 5-2).

On the theme, 'requirements for process management', it is realised that domestic enterprises fall short on all the elements, with the exception of the best practice and product specification elements in which enterprises scored more than 3 (Figure 5-1).

Crucial elements for ensuring safe food and making effective use of scarce resources e.g. risk assessment, HACCP, traceability, communication between suppliers, customers and employees, as well as emergency preparedness are all lacking, and this has implications for public health and safety, as well as accessing the global food manufacturing value chain. A similar pattern is depicted in Figure 5-2 & Figure 5-3, in which domestic enterprises are compliant only on the element 'employee responsibility'. Figure 5-3 reflects the fact that the foundation needed upon which to develop and implement an effective food safety management system is not in place and hence the risk of failure of the food safety system in Ghana is high.

The results also indicate gaps between the compliance levels of local SMEs and their international counterparts. SMEs are said to be the group of enterprises most burdened with the requirement to implement integrated food safety system. According to Taylor, (2001) and Fairman & Yapp, (2004), their limited resources and capability makes compliance onerous. In Figure 5-4 Figure 5-5, and Figure 5-6, it is realised that not only are the international SMEs better on almost all the elements of the three thematic categories, but they are also compliant on all the elements under the three thematic categories, with the exception of 'emergency preparedness'.

2. Significant gaps exist between the compliance levels of domestic enterprises and the food safety requirements of the international market for all three thematic categories of the requirements of the ISO 22000 standard (Figure 5-7, Figure 5-8 & Figure 5-9).

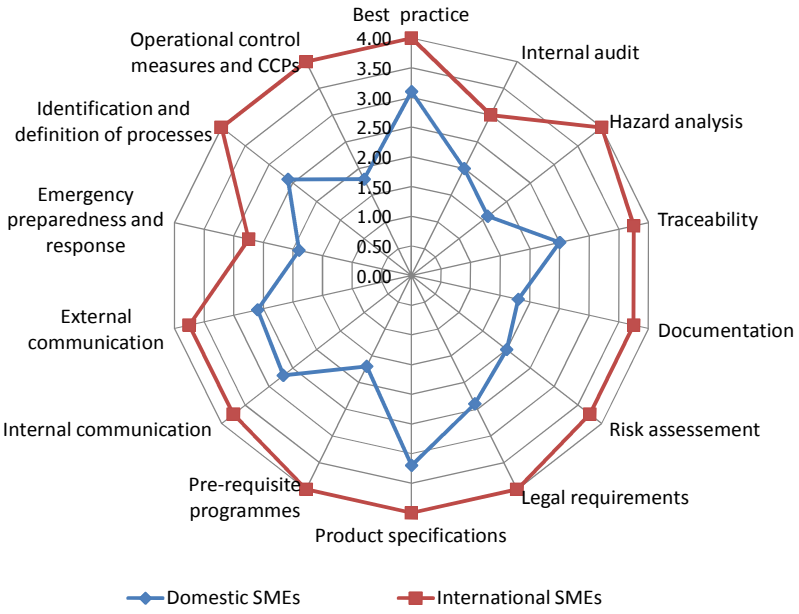


Figure 5-4: Requirements for process management: domestic SMEs vs. international SMEs

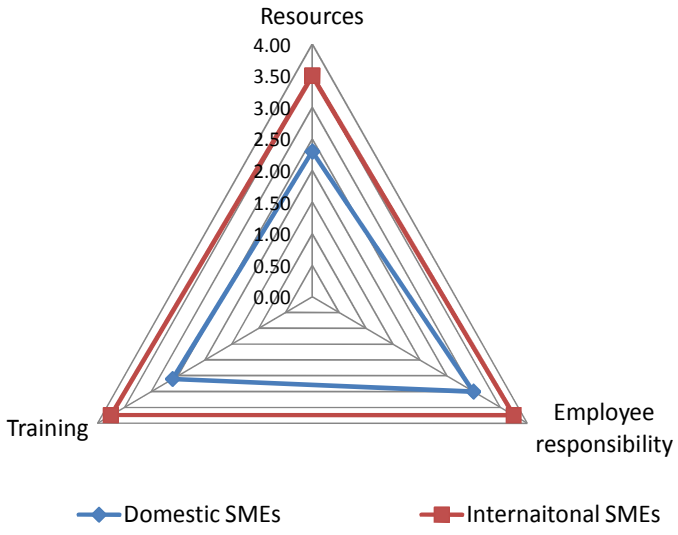


Figure 5-5: Requirements for resources management: domestic SMEs vs. international SMEs

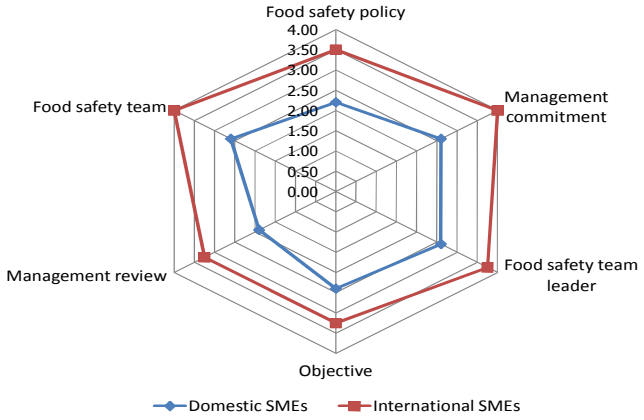


Figure 5-6: Requirements for management responsibility: domestic SMEs vs. international SMEs

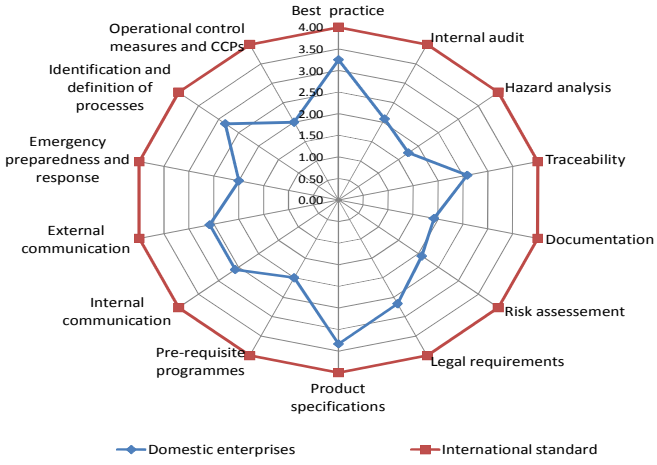


Figure 5-7: Requirements for process management: domestic enterprises vs. international standard

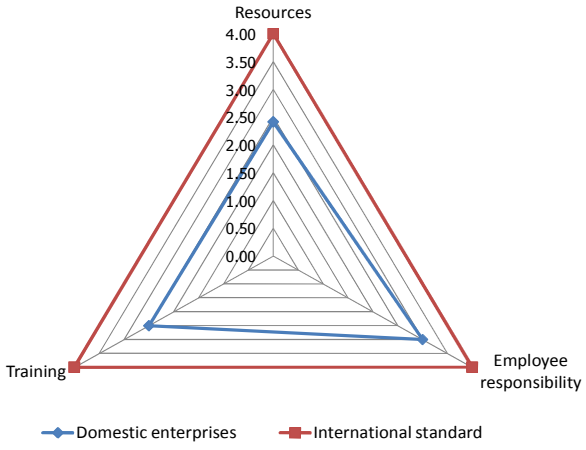


Figure 5-8: Requirements for resources management: domestic enterprises vs. international standard

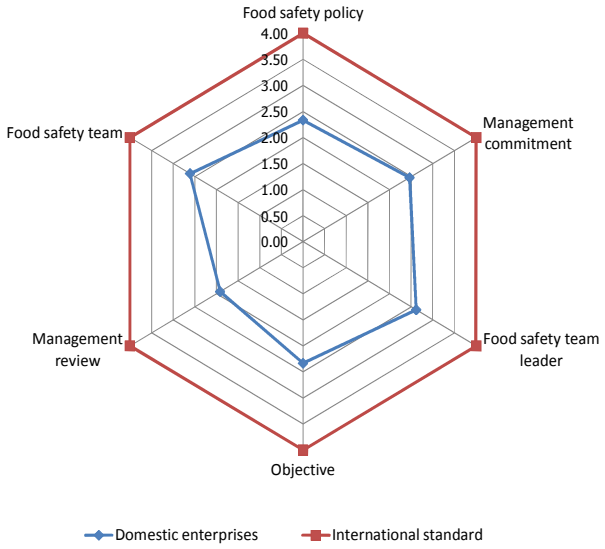


Figure 5-9 : Management responsibility: domestic enterprises vs. international standard

These charts demonstrate just how much work needs to be done to bring domestic food manufacturers in Ghana into compliance with the basic requirements of the international market to enhance their access to the GFMVC.

5.3 Results of Statistical Analysis

This section presents the results of the statistical analysis to verify if the null hypothesis:

"Domestic manufactured food of Ghanaian origin meets the basic requirements of the international market"

is true or whether the alternative is true.

The hypothesis is statistically represented as shown in Equation 1 & Equation 2.

$\bar{x}$ is the average performance rating which is equal to 64

The sample standard deviation was 17.6

The standard error was 4.4

Number of degrees of freedom is 15

The computed test statistic is Z = -1.33

A T-distribution table was used instead of a Z-distribution table to determine the critical value because of the sample size (n< 30). Using $\alpha = 0.05$ and 15 degrees of freedom, the critical values beyond which H_0 will be rejected was read from the T-distribution table as 1.75, however, because the test is left tailed (Rumsey, 2005), the critical value is -1.75.

Since the value of the test statistic (Z=-1.33) is greater than the critical value (-1.75) the alternative hypothesis is rejected (Wright, 1997; Rumsey, 2005). Hence, the data does not provide enough evidence to reject the null hypothesis. These findings are not in harmony with what the charts depict, however, there is a possible explanation for this. The lack of convergence between the statistical analysis and the results of the gaps could be attributed to the small sample size (n=16) that was used. Furthermore, from APPENDIX C it is realised that some enterprises which were compliant at the first stage but non-compliant at the second stage (due to scoring less than 3 on some individual elements) had considerably high performance ratings, and this raised the average, and hence impacted on the outcome of the statistical analysis.

5.4 Conclusion

This chapter aimed to establish the current compliance levels of food manufacturers in Ghana with both domestic and international food safety requirements. The evidence points towards the fact that the compliance levels of domestic enterprises are lower compared to that of their international counterparts established in Ghana, and in comparison to the requirements of the international market.

There are some domestic requirements that enterprises are required to comply with. However, these fall short of what has been established as the basic requirements for food safety and for the international market. Some enterprises are complying with the domestic requirements, however, others are not. Out of the 16 domestic enterprises that participated, approximately 75% were non-compliant with the basic requirements of the international market, and hence do not qualify for accessing the GFMVC. This demonstrates that indeed domestic food manufacturers in Ghana have issues to address to enhance their access to the GFMVC; hence the research problem is valid.

The gaps identified among enterprises may mean among other things:

1. That the management of domestic enterprises lack a commitment towards food safety;
2. That domestic enterprises genuinely lack the capability to comply with the basic requirement of the international market;
3. That there is a deliberate refusal to comply with set requirements, even though enterprises have the capability to comply.

Chapter 7 investigates these issues within the context of the national capability for food safety assurance in the manufacturing value chain in Ghana.

CHAPTER 6: FOOD SAFETY ASSURANCE IN THE UK FOOD AND DRINKS SECTOR

This chapter presents the findings of how food safety is assured in the UK food and drinks sector. A top-down approach is adopted to investigate the institutional, regulatory and policy frameworks implemented at the national level, against the backdrop of the prevailing contextual factors, and how relevant stakeholders have responded, in particular, food manufacturing enterprises. The perceptions of food manufacturing enterprises regarding the impact of the frameworks employed on food safety are also explored, and evidence is drawn on national surveys to examine the feasibility of current mechanisms to assure safe food, and hence enhance access to the global food manufacturing value chain (GFMVC).

6.1 Approach

The overall strategy adopted was a case study. However, within the UK food and drinks sector three approaches were adopted to support the overall strategy. Document analysis, survey and case study strategies were used to complement each other, since no single strategy was sufficient in itself to provide all the data required to investigate the system.

The UK food safety assurance system has developed and matured over several decades, and this may also mean that institutional structures and owners of the process have changed over these decades. The purpose of the document analysis was to help fill gaps in knowledge of the people interviewed with regards to the phenomenon of interest, facilitate triangulation (of documents, the account of regulators and the responses of enterprises). In addition, it was important to get a first hand view of what global, regional and national regulations required, in order to examine how regulators have interpreted and responded to the national requirements in practice, and how enterprises have also made operational these requirements.

A survey methodology was used because initial attempts to find participants for the study at the enterprise level were futile. This was because most enterprises were

operating a “no name no access” policy, and since the author did not have any direct contact details of persons in those enterprises, a publicly available database was the next most pragmatic option. The survey therefore requested for direct contact details, which facilitated the execution of the case studies at the enterprise level. The case study approach was the most appropriate for exploring the food safety assurance system in the UK because enterprise contextual conditions (e.g. size, export orientation and position within value chain) were anticipated to form an integral part of food safety assurance, and a case study method easily lends itself to the study of a phenomenon that is difficult to remove from its context (Yin, 2009). The document analysis is presented from sections 0 to 6.6. The results from the survey and case studies are coalesced and presented from sections 6.7 to 6.7.14.2

6.1.1 Document Selection and Analysis

As mentioned in section 6.1 access to historical data was essential in the study, and the most pragmatic way of accessing such data was through documented reports: published and unpublished. This was particularly helpful because some respondents were unwilling to give their own perceptions of the status of food safety in the food and drinks sector, and whether or not the current mechanisms being used to control food safety are viable for addressing food safety risks; they therefore gave access to documents that provided such insight. The documents included government white papers, national strategy reports, government legislations (including legislations enacted at the EU level), and private standards, as well as archived records such as key performance indicators (KPI) trends, national statistics and surveys.

The UK food safety assurance system is extensively published. Indeed, the publication record is too extensive for a complete analysis. Hence selection and sampling were adopted. The key strategy was to search the websites of institutions mandated by government to regulate and control food safety in the UK. This was also a way of ensuring the authenticity and credibility of documents selected and used. Search strings (e.g. food safety legislation, food control) were used to initiate a search for relevant documents. A number of key documents came up. Some of which focused on

the whole value chain, from farm to fork. However because the focus of the study was on food manufacturing, there was the need to further narrow down to the relevant documents. An initial review of some of the documents indicated their scope which facilitated a selection of which documents were most relevant to addressing the question of how food safety is assured in the UK. In addition, information provided by regulators in response to a semi structured interview script also facilitated a choice on which documents to review thoroughly to gain insight into the issues raised on the semi structured questionnaire. The references contained in the primary key documents provided links to secondary documents which were also useful.

Even though the main source of the documents used was the independent regulator (i.e. from the FSA website), not all documents were written by the FSA. A number of them were prepared by independent research institutions and committees which were either commissioned by the FSA or directly by the relevant government department, to provide an independent view or evaluation of particular aspects of food safety assurance in the UK. One can therefore claim a certain level of validity and reliability of the account given because bias is reduced (i.e. from the regulator giving its own account of how it is performing).

The aim of the analysis was to contribute to answering the question of how food safety is assured in the UK. The analysis of the documents was done to fit a set of pre determined elements (Neuendorf, 2002) identified from literature to demonstrate commitment to and compliance with international food safety requirements (see sections 3.3 to 3.3.5). The intent of the researcher was not to report all the details contained in the documents selected but to summarise the content relevant to the different elements of food safety capability previously identified. These summaries were then merged with data collected from respondents (regulators and quality or technical directors) to allow an evaluation of the effects of current mechanisms in use on the compliance of enterprises, and to make a general prediction of mechanisms likely to enhance the compliance of enterprises (in the form of a research proposition).

6.1.2 Survey

This approach was limited to food manufacturing enterprises. A structured survey-based questionnaire was developed drawing on existing literature which used other countries and sectors, as case studies, and the requirements of the ISO 22000 international food safety standard.

6.1.3 Research Instrument

The questionnaire (see APPENDIX D) was designed to investigate whether similar variables in terms of the drivers, benefits, challenges, success factors, and the practices adopted for ensuring food safety by enterprises in other contexts, applied to the UK food manufacturing enterprises.

6.1.3.1 Sample for Survey

The target population was food manufacturing enterprises, drawn from FAME, courtesy Cranfield University Library Resource. FAME is a database that contains information on enterprises (e.g. trading addresses, phone numbers, and website addresses) in the UK and Ireland. The target population contained both animal feed producers and manufacturers of food for human consumption. Within this target population, the sample frame of interest was manufacturers of food for human consumption. Out of the 3.4 million (number as of May 2009) enterprises hosted by the database, search criteria were used to narrow down to relevant enterprises in the sample frame. The criteria comprised: type of industry, industry location and status (active or dormant). The search string used was the UK Standard Industrial Classification of Economic Activity, SIC (2003), all Category 15, which represents "manufacture of food products, and beverages" (National Statistics, 2002). A total of 6553 enterprises fitting these criteria were exported to Excel. This number contained the group 15.7, which is "manufacture of prepared animal feed". The filtering tool in Excel was used to eliminate manufacturers of animal feed, dormant enterprises, and enterprises not specifying the description of their products. A total of 3124 enterprises fitting the set criteria remained, which belonged to 8 groups, manufacturing food

under SIC (2003). This data was manually cleaned to remove duplications, retailers, distributors, and enterprises providing financial services to food manufacturing enterprises. Stratified sampling was used to select prospective participants, aiming to ensure that the final sample was a good representation of the different sub-categories (e.g. production processing and preservation of meat and meat products, processing and preservation of fish and fish products, dairy-based product manufacturers, processing and preserving of fruits and vegetables) within the sample frame. A final random sample of 500 food manufacturing enterprises fitting the criteria set out was selected for mailing. The decision to use 500 stemmed from resource constraints. Numerical codes were manually typed onto questionnaires and envelopes to facilitate tracking and identification of which enterprises have returned questionnaires. The organisation and execution of the survey took place between May and August, 2009.

A total of 37 (7.4%) mailed questionnaires were returned unopened; because enterprises had either moved addresses or were no longer in operation. The total number of responses received were 120[18], representing approximately 26% of the final sample (463).

6.1.3.2 Analysis

The responses received were manually entered into a workbook in Microsoft Excel, and prepared for analysis, by exploring measured values to consider whether responses were normally or non-normally distributed, whether there were missing values[18], and then examined to see if the assumptions of the statistics to be used were met. The processed data was then imported into SPSS 17.0. Non-parametric tests were deemed appropriate primarily because the responses on the various variables were not normally distributed (Morgan et al, 2007). The data of a categorical nature (particularly the drivers, benefits and challenges) which were also dichotomous measurements were analysed using the chi-square statistical technique (Morgan et al. 2007) to investigate the differences in the groups of respondents (SMEs vs. large enterprises). Phi was reported as opposed to Cramer's V, to investigate the strength

[18] Eight responses were discarded because there were significant amounts of missing data, leaving the total usable data responses of 112 (response rate of approximately 24%).

(magnitude) of the effects of 'size of enterprise' on the drivers for, benefits of and challenges to compliance, because the cross-tabulation was a 2 *2.

The assumptions of Chi-square, Phi and Cramer's, V are (Morgan et al, 2007):

1. The data for the variables must be independent; i.e. each subject is assessed only once.
2. Data are treated as nominal even if ordered.
3. For Chi-square, if the expected frequencies are less than five, the test of significance is too liberal. At least 80% of the expected frequencies should be five or larger. All should be at least five if you have a 2*2 Chi-square.

The data set produced by the survey obeyed these assumptions. Alpha (α), the critical value beyond which the null hypothesis will be rejected was set to 0.05 (Wright, 1997).

Exploratory Factor Analysis (EFA) was conducted to investigate the nature of the constructs underlying the measured variables, which influence successful implementation of food safety management systems (FSMSs). The measured variables were collected using a five point Likert scale, where 1, represented 'unimportant' and 5, represented 'very important'. Initial exploratory data analysis revealed that the measured variables could not be assumed to be approximately normally distributed, and hence the measure cannot be classified as interval. Against this background, the measure for the analysis is ordinal. A basic requirement for factor analysis is that the measured variables be interval (Child, 2006). Therefore the data did not meet this requirement; however, SPSS Inc. (1998) suggest that ordinal data could be used for factor analysis as it does not have significant detrimental effects on the outcome of the results.

The Maximum Likelihood (ML) (Comrey & Lee, 1992) method was used for extraction; according to DeCoster, J. (1998) it is generally the best method to use unless there is a serious lack of multivariate normality (skewness >2, kurtosis > 7) in the measured data. The approach provides a goodness of fit test, allowing the researcher to determine whether the obtained solution is a good fit to the measured data points. The null hypothesis, H_0 is that the factor solution adequately accounts for the data, and the alternative hypotheses, H_1 is that there is significant amount of discrepancy. Variables

with significant loadings within factors, greater than ± 0.5 were used to define the characteristics of the factor.

To improve the interpretability of the factor solution, a varimax rotation method was used. Cronbach's alpha (α) (Morgan et al, 2007) was used to assess the internal consistency reliability for the overall scale of measurement and for individual elements within the scale.

The remaining questions on the practices adopted for the implementation of integrated FSMSs, that also produced categorical data were analysed with descriptive statistics (summaries of percentages in categories) (see APPENDIX C for a summary of the descriptive analysis). However, the main intent was to use the responses generated, particularly on the practices used by enterprises to complement the data collected from interviews with food manufacturing enterprises. The responses to the open-ended question were clustered to identify emerging themes (Mile & Huberman, 1994).

6.1.4 Case Study

The findings from the survey and document analysis only provided a partial understanding and picture of food safety assurance in the UK. In particular, it did not provide insight into the nature and range of issues that worked together to produce the outcomes of food safety and compliance levels observed among enterprises, or initiatives implemented to develop the capability of enterprises. A case study strategy was adopted to make up for these limitations (Yin, 2009). Three main institutional groups were selected for detailed case study investigations: statutory regulators of the sector (e.g. DEFRA, and FSA), institutions involved in food safety capability building in the UK (e.g. Improve, and the Food and Drinks Federation (FDF)) and food manufacturing enterprises. Selection of the institutional groups was done on the basis that they had particular features or characteristics which enabled a detailed exploration of the issues raised (purposive sampling) (Marshall & Rossman, 1999) and others using Snowballing (Marshall & Rossman, 1999).

In all, 15 potential respondents were contacted from two of the institutional groups identified (excluding food manufacturing enterprises). However, only six respondents actually agreed to participate.

Food manufacturing enterprises were drawn from the survey sample[19], and a selection of respondents was made strictly of those indicating on the survey-questionnaire their willingness to participate further via interviews. A total of 22 enterprises gave their details to participate, however, when the time was due to set up interviews, a further 16 were unable to participate.

6.1.4.1 Research Instrument

Three research instruments were used to investigate the UK food and drinks sector; one for each institutional group identified earlier in section 6.1.4. The research instrument used for government regulators (APPENDIX G) was designed to explore the mechanisms that have impacted on the current status of food safety, and the appropriateness of such mechanisms for assuring safe food, as well as how capability has been developed to ensure safe food. The second research instrument (APPENDIX H) was for sector institutions involved in capability building, for food safety assurance; with a particular interest in their role in enhancing the compliance of enterprises with food safety requirements. The third research instrument (APPENDIX I) was interested in the impact of both global and government regulation on food manufacturing enterprises, with a particular interest in whether the institutional changes undertaken have impacted on the safety of manufactured food, their compliance and therefore consumer protection; whether there were alternative mechanisms which could have achieved the same outcome, and the impact of the manufacturing environment on their ability to comply with set requirements. The use of standardised research instruments for each target group increased interviewer consistency (Fowler, 2002).

[19]The survey requested for direct contact details, which facilitated the execution of the case studies at the enterprise level.

6.1.4.2 Analysis

Some of the questions of interest in the study related to a process (e.g. Q 6 of the questionnaire for food manufacturing enterprises) and others related to the identification of categories (e.g. Q4 of the questionnaire food manufacturing enterprises), others required the identification of a range of factors emerging from the data (e.g. Q7 of questionnaire for food manufacturing enterprises) and instances.

Even though a general qualitative approach is adopted to address the data because of the format in which it was, the variations in the questions demanded that particular analytical approaches were adopted for particular questions. The analytical approach adopted for the case study data is showed in Figure 6-1.

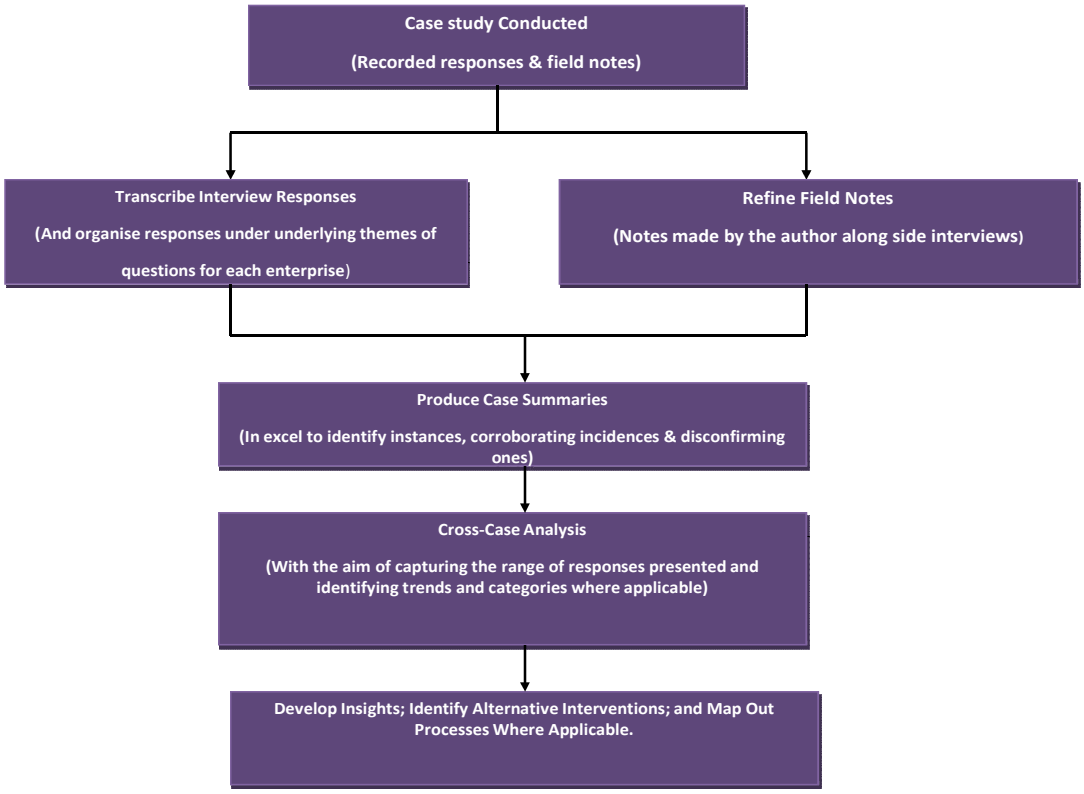


Figure 6-1: Analytical approach to responses from cases

The interviews conducted were all in recorded format. The recorded interviews were first transcribed into case study notes to correspond to the question numbers, which had higher level themes identified from the literature review as its foundations. The themes were used to develop a descriptive framework (Yin, 2009).

The responses usually did not follow the outline of the script, so the author went over the raw transcripts to organise the data to correspond to the descriptive framework. These case study notes were synthesised with field notes made by the researcher alongside interviews.

Table 6-1: Sample analysis of case results for question 6

Phases of the operationalisation process	Quotes from response	Enterprise
Gap Analysis	"Because we are a big company, we rarely begin the design from scratch. It is often an improvement that is required. We start with the gap analysis"	FoodManCo1
	"We carry out internal audits of the requirements of the standard against areas of operation in the plant".	FoodManCo3
Planning	" A multifunctional team (including the QA manager or technical director(TD) and other departmental heads), headed by the QA manager or the TD work out what it will take to comply with the requirements of the new standard or regulation"	FoodManCo1
	"The quality manager and his team usually lead such programmes"	FoodManCo4
Design, Development and Documentation	"The technical team writes (updates) the procedures to correspond with the actions raised in the gap analysis, with input from the relevant technical areas"	FoodManCo1
	"The system is based on HACCP, and is developed by the technical director, with input from the QA manager".	FoodManCo2
Implementation & Communication	"Procedures become actions on the shop floor essentially through training"	FoodManCo1
	"Shop floor staffs are required to be trained to level two standard for foundation food hygiene after about 3 months in the business. Team leaders are trained to level 3 HACCP"	FoodManCo4
	"We use a series of refresher training, and discussions among the workforce"	FoodManCo5
Monitoring and Continuous Improvement	"After training, it is just a matter of monitoring to see if the system does what it is expected to do. After the first attempt, it will be revised quickly based on what is applicable and what is possible"	FoodManCo1
	"After implementation, we monitor KPIs to see if the system is working as required"	FoodManCo5
	"An incidence procedure is implemented and this applies to all our companies. It includes product recalls which must be tested once a year and updated"	FoodManCo6

For some questions (e.g. Q6), preliminary analysis of the first few cases indicated the existence of categories (emergence of key words that denoted phases of the process) and these became the categories that guided subsequent case study investigations, and also became sub-categories/phases under which relevant responses were

organised. Figure 6-1 gives an example of a table with responses organised that reflect the different phases of the process of making operational food safety requirements in practice.

The elements of the descriptive framework were outlined in Microsoft Excel against the different enterprises that responded and case summaries developed against each element of the descriptive framework. Summaries were developed on the basis of the categories that emerged from instances occurring in the data.

A comparison of the responses from the different food manufacturing enterprises in the UK facilitated the development of the process for implementing the requirement of food safety regulation and managing suppliers.

A cross-case analysis (within case analysis) also helped to identify rival explanations (Stake, 1995; Yin, 2009) for the outcomes observed amongst enterprises, particularly among the data on the impact of statutory regulation on compliance, alternative mechanisms for food safety assurance and the influence of the manufacturing environment on compliance.

6.2 Strategic Response to Food Safety

The two dominant strategic responses to food safety in the UK can be described as 'proactive' and 'reactive loyalty' (Figure 6-2). The main objective of government is to protect public health and safety, primarily motivated by the historic food safety crisis in the UK. Food safety assurance is therefore realised through mechanisms that ensure continuous improvement in the safety of food (Strategy Unit, 2008) (proactive loyalty).

By virtue of a single market for food in the European Union (EU), and the UK being part of this regional group, the government implements regulations that are enacted to ensure food safety at the regional level (hence reactive loyalty). This is corroborated by the fact that approximately 90% of the food safety regulations that are applied in the UK are promulgated at the European Union level (Strategy Unit, 2008).

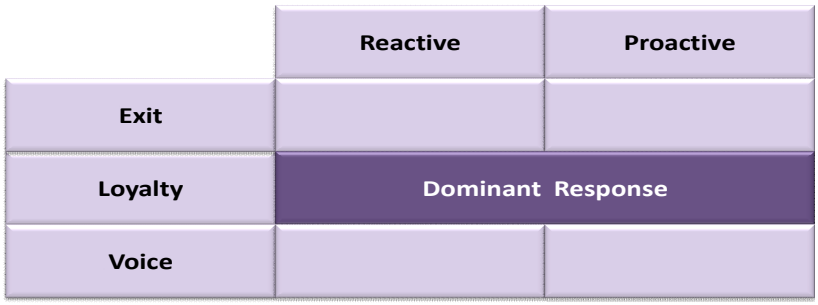


Figure 6-2: Key national strategic responses to food safety in the UK

Apart from the key strategic options, there are others that emerge such as 'proactive' and 'reactive voice'. As a member of intergovernmental public and private sector institutions (e.g. CAC, WTO and ISO), as well as non-governmental sector institutions, the UK participates in committees responsible for negotiations and decision-making relevant to food safety agreements and regulations.

Through similar institutions, the country also participates in the standards development process through 'voice'. The UK, for instance, participates in 209[20] out of the 217 technical committees of ISO (it has observer status for 5 committees, a participating member for 184, and a secretariat for 20 technical committees)[21], and is responsible for commodity standards developments, and this provides an avenue through which to voice their views on the technical content and utility of particular standards. Data to investigate the strategic choice indicating 'exit' was not available.

6.3 Evolution of Statutory Food Safety Regulation in the UK

The UK Food safety regulation dates back 130 years. Historical archived documents suggest that the Adulteration of Food and Drinks Act was enacted in 1860 to prohibit the sale of food or drink which was adulterated with ingredients that have the potential of causing injury to human health; 12 years later, the Adulteration of Food and Drugs Act 1872 was introduced to authorise local enforcers to take samples, prosecute and appoint a public analyst.

[20] It must be noted here that some technical committees have sub-technical committees. The numbers indicated here are those for the main technical committees.
[21] The data was extracted from ISO's website (http://www.iso.org/iso/about/iso_members/iso_member_participation_tc.htm?member_id=2064

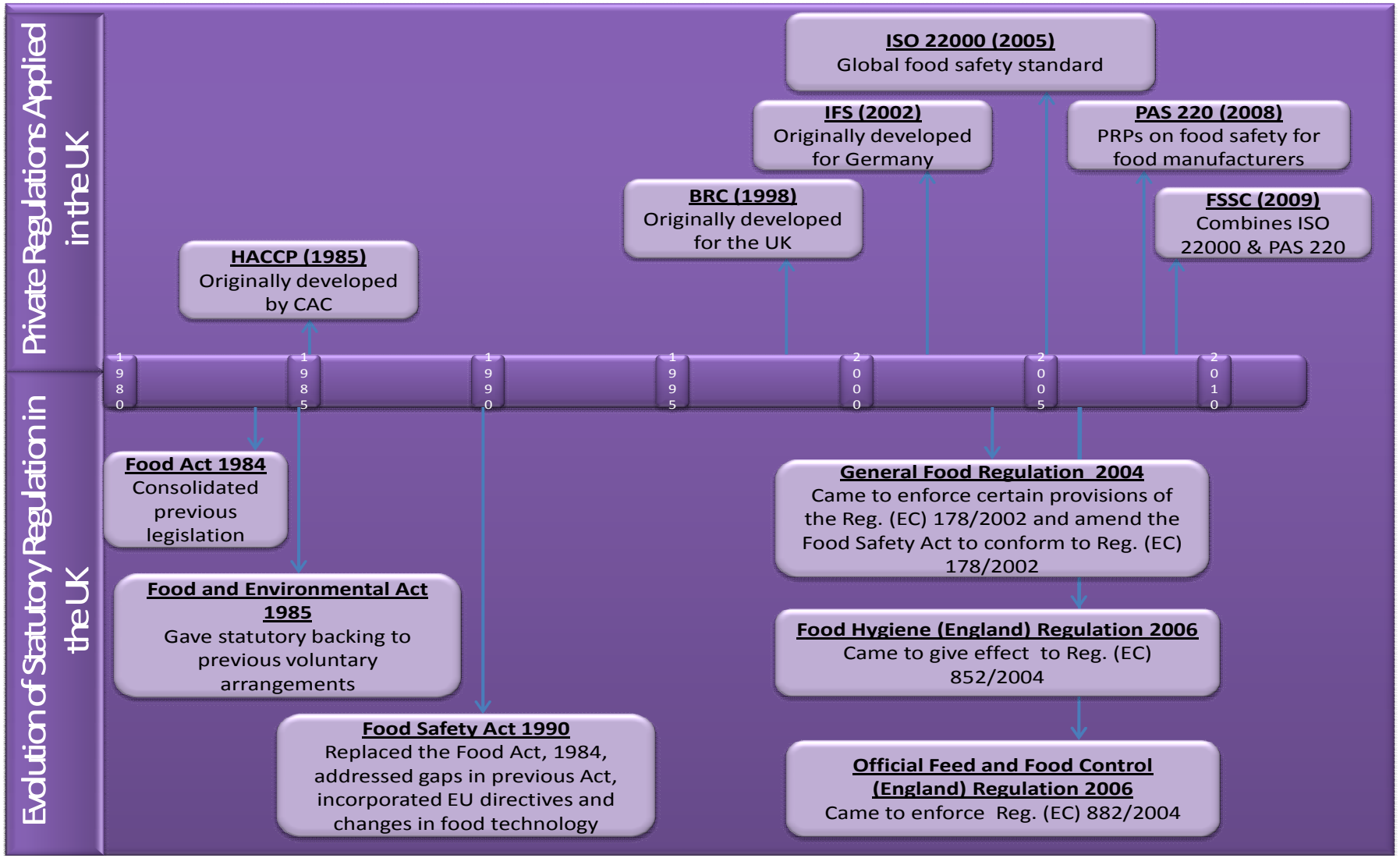


Figure 6-3: Food safety regulations in the UK from the 1980s

The year 1875 saw the enactment of two Acts: the Sale of Food and Drugs Act 1875 and the Public Health Act 1875. The former required that no person sells to the prejudice of the purchaser any food or drug which is not of the nature, substance and quality of the article demanded by the purchaser, and the latter gave local officers the mandate to inspect and seize unwholesome food.

In 1928, there was the enactment of the Food and Drugs (Adulteration) Act, which consolidated earlier legislations on adulteration. The Act introduced penalties for false or misleading labels and advertisements and ordered the regulation of all value chain activities. The Act also required that official notification be given of food poisoning cases

The year 1938 saw the combination of the adulteration and public health clauses into yet another Act: the Food and Drugs Act 1938. The primary aim of the above Acts was to ensure that food sold to consumers was wholesome.

In 1955, there was yet another Food and Drugs Act, which was later amended and named the Food and Drugs Act 1976. The purpose of the Food and Drugs Act 1955 and its amended version in 1976 was to authorise Environmental Health Officers to close food premises which sold food not complying with statutory requirements.

In the same year, the Food and Drugs (Control of Food Premises) Act, 1976 was introduced to authorise the registration of food premises. In 1984, the Food Act was introduced to consolidate all existing legislations and was aimed at ensuring the safety of consumers. The Food and Environmental Act 1985 was later introduced to give statutory backing to food safety arrangements that were previously voluntary (see Figure 6-3 for regulations implemented from the 1980s). The UK decided to make more stringent regulations concerning food safety partly because of the prominent food crises that characterised the UK food value chains in the 1980s, and the resultant pressure from major stakeholders. In response, government introduced the Food Safety Act, 1990, to replace the consolidated Food Act 1984. This Act continues to remain the major framework for a lot of the domestic food legislations in Great Britain (England), with their corresponding versions being used in other parts of the UK.

There are other secondary regulations and directives which are used to complement the Food Safety Act, 1990. These are European Commission Regulations the UK is required to comply with. The Commission's Regulation, General Food Law Regulation (EC) 178/2002 on general food safety is enforced in Great Britain by the General Food Regulation 2004, which also amends the Food Safety Act, 1990. Regulation (EC) 178/2002 came to replace the food safety parts of the Food Safety Act, 1990 and provides a framework for food and feed laws within the European Commission (EC). The regulation harmonised the definition of 'food', prohibits the sale of unsafe food and requires traceability through food value chains.

Alongside the main regulation introduced by the EC, a series of other regulations have been enacted to address specific sub-sectors (FSA, 2009):

- Regulation (EC) 852/2004 on the hygiene of foodstuffs for all food business operators; The Food Hygiene (England) Regulation 2006 (SI 2006/14) (requires enterprises to use HACCP evaluations) was also introduced in England in 2006 to give effect to the provisions of the EU legislation. This regulation was amended by the Food Hygiene (England) (Amendment) Regulation 2007 (SI 2007/56).
- Regulation (EC) 882/2004 on official controls performed to ensure the verification of compliance with feed and food law, animal health and animal welfare rules. The Official Feed and Food Controls (England) Regulations 2006 (SI 2006/15) was also introduced to apply the EU Official Feed and Food Controls Regulation in England.

6.4 Private Regulation of Food Safety

The involvement of the private sector in the regulation of food safety in the UK was primarily in response to statutory product liability regulation. This was to ensure that suppliers had in place adequate 'due diligence' procedures to prevent criminal or civil prosecution (Lawrence et al., 2002). In order to monitor effectively own-brand products, retailers implemented in-house food technology departments in the 1980s. These efforts were to respond reactively to food safety issues that inevitably arose. Hands-on approaches were adopted where retailers developed manuals based on food

safety principles to guide suppliers. The governance approach gradually changed during the 1990s, when retailers encouraged their suppliers to use 3rd party auditors, approved by retailers, to verify and validate their food safety systems (Lawrence et al., 2002). The requirements and approaches used by 3rd party auditing institutions had significant variations characterising them, and hence consensus was reached by British retailers on a common minimum standard for food safety. This was to provide 3rd party auditors with a common basis with which to provide 'due diligence' defence for retailers. This saw the introduction of the British Retail Consortium's (BRC's) standard in 1998 to specify the basic minimum requirement for food safety. The BRC standard is an integrated approach to food safety management, developed on HACCP principles. The standard was initially meant for the UK; however, it has now attained global recognition and is being applied in a variety of countries.

Presently, other private standards (Figure 6-3) are being adopted by British retailers and other chain actors which also specify the basic minimum requirements for food safety, acceptable by relevant stakeholders, at the different functional nodes in value chains. Retailers have also implemented their own standards and procedures, which require all their suppliers and prospective suppliers to comply with, in addition to the globally acceptable international standards.

6.5 Food Safety Capability in the UK

Food safety capability is realised through the interplay of the stock of institutional, regulatory and policy frameworks, the values that shape regulatory systems and the resources that facilitate the effective functioning of regulators and compliance of the regulated. These elements are the essential component of developing 'reputational effects' and qualifying for orders in the GFMVC. The following section presents the key components of the UK's food safety capabilities.

6.5.1 Key Stakeholders

Food safety assurance in the UK is realised through the efforts of both the public and private sector (Figure 6-4).

These include:

- **Government agencies and ministries**, e.g. the Department of Health (DoH), the Food Standards Agency (FSA), which is a non-ministerial autonomous institution, have key responsibilities mandated by law to regulate food in the UK. Their roles include the governance of food safety through mandatory institutional, regulatory and policy frameworks;
- **Non-governmental sector bodies** e.g. British Standards Institution (BSI) and BRC, develop private standards used to govern value chains. In theory, these standards are supposed to be voluntary but in practice the driving force is de facto mandatory. Other private sector institutions provide all kinds of support regarding certification, testing, inspection, training and equipment calibration. There are other bodies (e.g. UKAS*)* that oversee institutions providing support services to enterprises. These institutions provide accreditation services to third party service providers, *inter alia*. The private sector is also involved in research, and provides information and training to industry, towards capability development for food safety assurance;

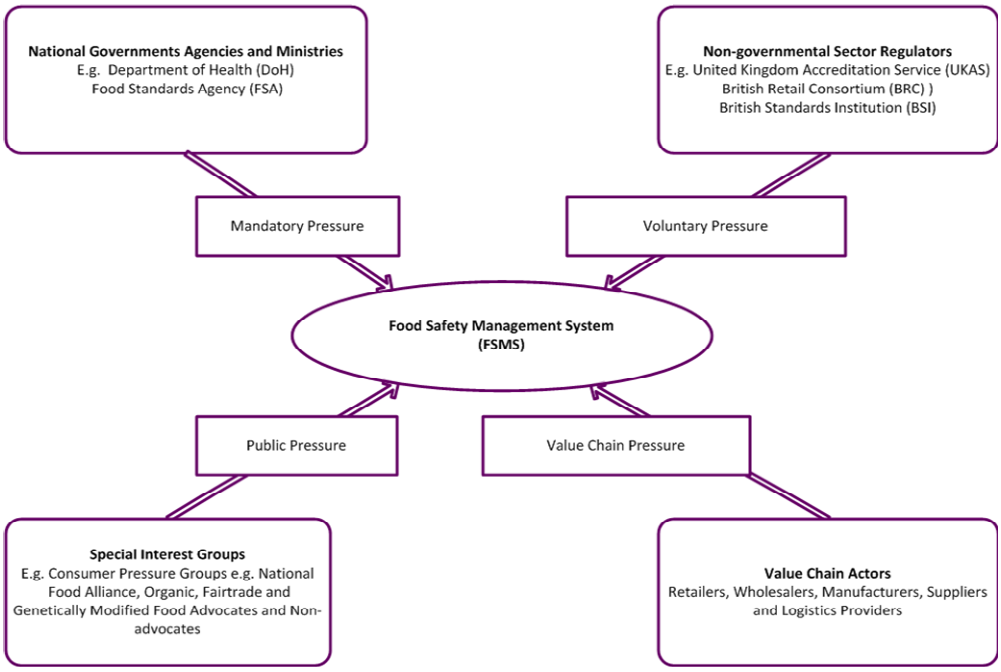


Figure 6-4: Key stakeholders in food safety management in the UK

- **Special consumer interest groups** are a collection of people with common interest, who influence institutional, policy and regulatory frameworks, through acting as the voice of the ordinary citizen in any governance process. These special interest groups put public pressure on relevant institutions responsible for the governance process, to ensure that the consumer interest is incorporated into decision making.

  Consumer representation on decision making and policy in the UK is particularly significant. There are specialist consumer organisations which focus exclusively on both general consumer and sectoral interest. Some of these bodies are established by the formal institutional arrangement of government, for consumer representation and with specific statutory status (Simmonds, 2002). However, there are others that are typically established by non-governmental organisations. Institutions such as Consumers' Association in the UK advocate for the welfare of consumers, and protect them from corporate abuse through the exertion of public pressure on relevant stakeholders. They also educate and inform consumers, and resolve (with the regulator, where necessary) consumer complaints (Tansey & Worsley, 1995; Simmonds, 2002). Furthermore, consumer bodies are involved in meetings of national or international technical committees during the standards development process, to ensure that the regulations developed conform to standards that address issues of concern to consumers.
- Finally, there are **value chain actors** (raw material suppliers, manufacturers, distributors, retailers), which are the primary actors in ensuring that manufactured food is safe. The actors receive all kinds of pressure (mandatory, voluntary and public pressure) from actors external to the chain, to ensure that the manufactured food reaching the consumer is safe. Consumers are part of this group.

6.5.2 Food Laws and Regulation

The journey of the UK from the late 80s through the early 90s, where the risk of food safety was perceived to be high, to the current state has been realised through regulatory mechanisms, as shown in section 6.3. The Food Act, 1984 and the Consumer Protection Act, 1987 were in existence before the current Act (Food Safety Act, 1990). Evidence prevailing at that time (Corbally, 1989) indicated that existing regulations could not provide the consumer protection needed against food safety hazards. The nature of the Consumer Protection Act means that consumers will come to harm (possibly death) before enforcement; and this defeats the fundamental rights of every consumer, to have access to safe food, as well as the government's aim to protect consumer health and safety. Available evidence brought to the fore the fact that the risk of food to consumers had not been adequately considered in previous regulatory designs, and hence reforms were necessary.

In 1984, a policy paper was presented to the Institute of Environmental Health Officers' (IEHO) annual congress. The paper detailed what the IEHO thought was the way forward, for reforms in food legislation that would be capable of coping with the dynamic nature of the food system and future needs. The then government agreed that there was the need to reform food legislation to adequately protect consumers. The government therefore issued a consultation document on the review of food legislation. The events characterising the consultation process culminated in a government's white paper, *Food Safety – Protecting the Consumer*, in July 1989. The policy paper outlined among other things what government proposed to be a new food bill, to address future needs. However, its content was criticised for falling short of the nature of regulation capable of truly achieving the paramount objective of government: protecting the consumer. Against this backdrop, the IEHO issued a policy statement which had as its basis the protection and enhancement of the health of the consumer both now and in the future. According to them, it was necessary that the new statutory instrument was not *purely reactive*, addressing just the current perceived need to strengthen legal protection for consumers, but provides an enabling framework to ensure future developments are also provided for (Corbally, 1989). In

the view of the IEHO, any new legislation that is workable and effective in protecting consumers must have regard for specific areas, including:

- A statutory duty of care placed on employers and employees in the food industry, to ensure the hygiene, quality and safety of food and the health of consumers;
- The imposition of a duty on food enterprises with regards to the training of food handlers and the employment of suitably qualified personnel; any training incorporating a test of competence;
- More effective powers of closure and means to prohibit unhygienic practices and processes;
- A scheme of licensing of all food premises by local authorities with licensing by prior approval for new businesses; local authorities to be given the powers to revoke a license when conditions fall below those required by law.
- The development of approved codes of practice, incorporating microbiological standards by the Food Policy Agency.

Most of these recommendations were incorporated into the new statutory regulation: the Food Safety Act, 1990. However, there are other regulations which are combined with the Food Safety Act, 1990, as amended (similar versions available for Scotland, Northern Ireland and Wales). Secondary regulations are issued to implement European Community Regulations (section 6.3) and Directives under the European Communities Act, 1972, and the Consumer Protection Act, 1987 of the UK provides a generic framework for all products.

The Food Safety Act, 1990 (as amended) and its supporting regulations imposed, have been developed based on risk assessments, and expect enterprises to base their food safety management systems (FSMSs) on the same principles. The Food Hygiene (England) Regulation, 2006 particularly requires enterprises to use Hazard Analysis Critical Control Point (HACCP) evaluations to deal with risks associated with food processing and manufacturing.

Even though statutory regulations have been generally criticised for being totally prescriptive and restrictive, the Food Safety Act, (1990), as amended and its supporting

regulations depart from this supposition. The regulations give scope to food manufacturing enterprises to adopt whichever mechanisms they deem appropriate to deliver the outcomes required by the Act. However, certain provisions have been laid down which must be complied with. There are three main provisions (Sections 7, 14, 15 of the Food Safety Act, 1990) which constitute offences, under the Food Safety Act, 1990 (as amended). The primary defence is the 'due diligence' defence (FSA, 2009). This defence protects consumers and shields enterprises from being convicted in the event of crises if they have taken 'all reasonable' precaution to avoid committing the offence. This due diligence defence is also applicable to offences under the General Food Regulations 2004 and the Food Hygiene Regulation 2006 (EC Regulations 852/2004, 853/2004 and 854/2004). What is 'reasonable care' is determined by the courts, in the context of the case presented, and takes into account all facts in a particular case (FSA, 2009).

The scope of statutory regulation in the UK covers: Information measures, which aim to provide consumers with adequate information to make appropriate decisions, concerning the status (including nutrition and safety) of food, and their approval of the processes that deliver that product; prior approval for particular products; and Food safety standards. Food safety standards have become the norm for assuring safe food in the food and drinks sector. The Consumer Protection Act, 1987, takes the form of *target standards,* by imposing criminal liability for pre-specified harmful consequences arising from a product. *Performance standards*, even though not explicitly stated by the laws that apply, are used to verify allowable levels of safety for specific products, appropriated through sample testing, either on/at the end of production lines, and these are complemented with *process standards*, which require the use of integrated approaches for the assurance of food safety.

6.5.3 Organisational Arrangements

The responsibility for food safety in the UK previously lay with two key government departments: the Ministry of Agricultural Food and Fisheries (MAFF) (now Department of Environment Food and Rural Affairs (DEFRA)) and the Department of Health (DoH).

These responsibilities included formulating policy, standards and providing guidelines and advice to relevant stakeholders.

As part of recommendations to proactively deal with both current and future needs to protect consumers in 1989, the IEHO recommended the formation of an agency with the powers to determine food policy for the whole of the UK. The suggestion was for the agency to have regard for all matters relating to food and the protection and enhancement of public health (Corbally, 1989). In response, the government formed a dedicated, autonomous national food safety agency, 'The Food Standards Agency' (FSA), which is mandated by law (Food Standards Act, 1999) to regulate and oversee food safety activities. Government departments still hold responsibilities for certain aspects of the value chain, which are outside the interest of this study. Figure 6-5 gives an overview of the current organisational arrangement for food safety assurance in the UK food and drinks sector.

Food safety is a devolved issue and hence the FSA has representation in the three devolved administrations: FSA Wales, FSA Scotland and FSA Northern Ireland.

The FSA also derives its mandates from domestic regulations enacted to implement Regulation (EC) 882/2004, at the national level. The Agency executes its functions within a risk analysis framework that makes use of science-based approaches and evidence to inform decision-making. Risk assessments are commissioned by the Agency to research groups, to provide evidence upon which policies are based. In addition to this, independent scientific committees and advisory groups also provide advice to the Agency, to ensure that the advice given to consumers is based on up-to-date scientific evidence. Risk management and communication is primarily the responsibility of the FSA. These include developing and implementing rules covering hygiene, additives, contaminants, labelling and composition of food, public health issues and coordination of food control activities.

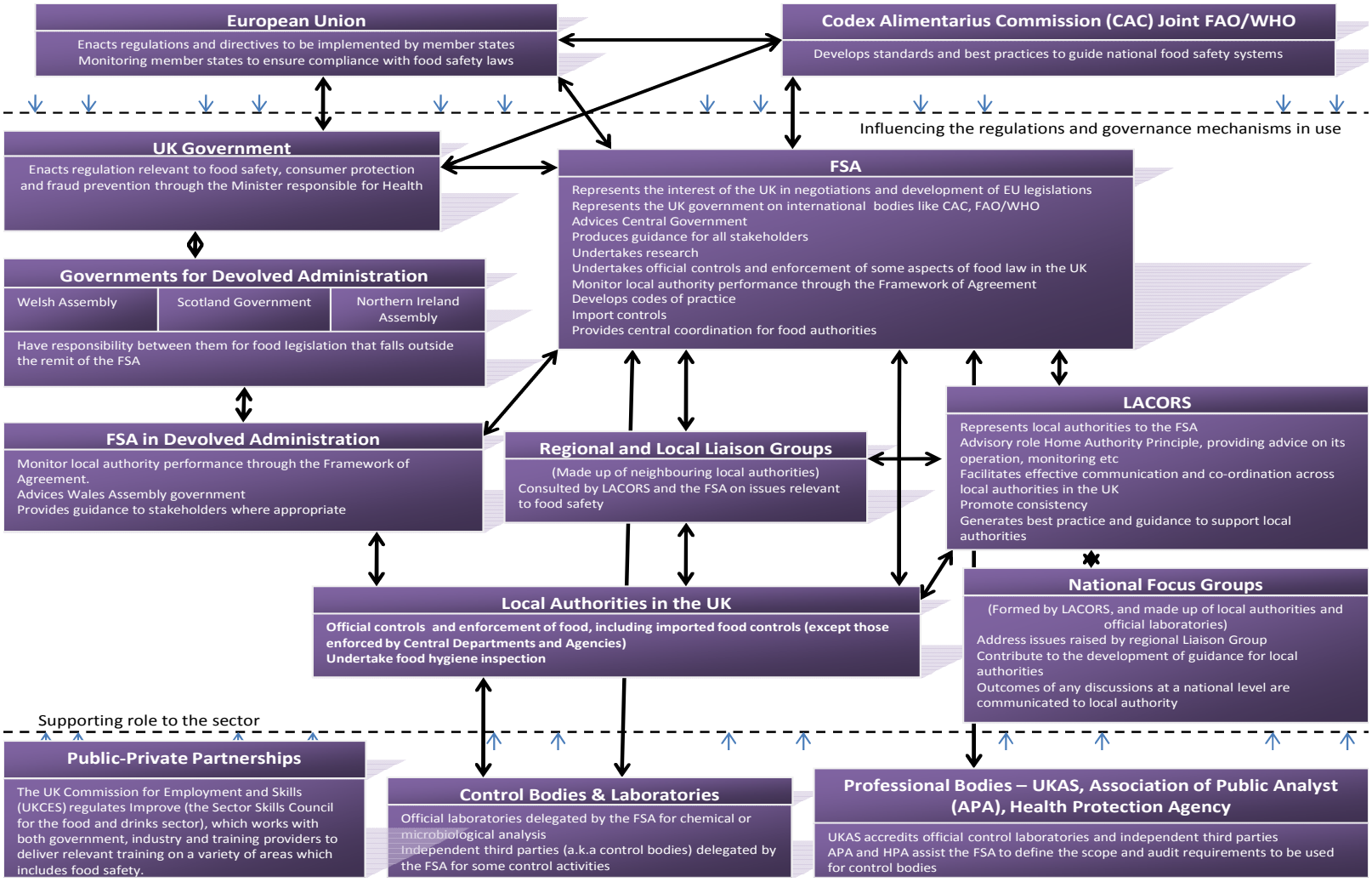


Figure 6-5: Organisational arrangements in the food and drinks sector

The FSA represents the interests of the UK in negotiations and development of EU legislation, and represent the UK on international bodies (e.g. CAC). In addition to this, the Agency has responsibilities for official controls and enforcement of some regulations made under the Food Safety Act, 1990, and partakes in some aspects of inspection, licensing and approval of facilities for processing specific foods.

Before the coalition government in 2010, the roles and responsibilities of the FSA included all other aspects of food that were of interest to consumers (e.g. nutrition), however, after the new government, these functions have been streamlined and limited to food safety in England and Wales (FSA, 2011). The FSA continues to hold those responsibilities in Scotland and Northern Ireland. This reflects the potential impacts that changes in governments can have on the control and governance of food safety in a country. The Agency, however, still holds its independent status.

Local authorities in the UK are responsible for the day-to-day official control and enforcement of food safety regulation in the food and drinks sector (including imported food controls) (FSA, 2009). Official laboratories are designated by the FSA to support the work of enforcement officers, through chemical analysis or microbiological examination of food samples taken by enforcement officers, during the execution of their duties.

Although the FSA in England (similar structures in devolved administrations) and local authorities have been mandated to organise and execute official control functions in respect of food and drinks (i.e. the competent authorities), control activities may be delegated[22] to independent 3rd parties or 'control bodies', to provide support in terms of e.g. monitoring and verifying compliance of enterprises with food law. This approach is particularly useful when the resources of the Agency cannot be stretched to enable the execution of all assigned functions under relevant regulations. However, the responsibility for formal enforcement action (where non-compliance with legislation is found) may not be delegated (FSA et al., 2010).

[22] There is a provision under Regulation 882/2004 that allows this. Regulation 882/2004 is enforced in the UK by the Official Food and Feed (England) Regulation 2006.

The control functions of the institutions described above: FSA, local authorities, control bodies and food laboratories, are supported by a variety of independent external institutions. The United Kingdom Accreditation Service (UKAS) accredits official control laboratories to requirements specified by the FSA, jointly with the Association of Public Analyst (APA) and the Health Protection Agency. A number of other institutions (e.g. Local Authorities Co-ordinators of Regulatory Services (LACORS)) are also involved in the coordination of food authorities; these are discussed later in this section.

Even though local authorities organise training for enterprises, the private sector is prominently involved in ensuring that enterprises have the capability and competence to respond positively to enacted regulations. Capability development to assure safe food at the enterprise level is achieved through a public-private partnership arrangement.

Improve (the Sector Skills Council for the food and drinks sector) works with government, industry and training providers[23] to facilitate capability development at the enterprise level. Improve is regulated by the UK Commission for Employment and Skills (UKCES); in that it receives its licence to operate and funding from UKCES. UKCES also oversees the operational delivery performance and continuous improvement of Improve.

6.5.4 Mechanisms for Coordination and Cooperation

The number of authorities involved in food control functions makes the need for coordination essential to ensure coherence, avoid gaps (FSA et al., 2010) and make effective use of available resources. The FSA provides central co-ordination of control and enforcement of food safety, and standards legislation by local authorities in the UK.

Local Authorities Co-ordinators of Regulatory Services (LACORS), created by the Local Government Association (LGA) for local authorities also facilitate effective

[23] The National Skills Academy (NSA), the commercial arm of Improve coordinates the National Skills Academy Network of Excellence, which is made up of training providers selected on the basis of their capability to deliver quality training.

communication and co-ordination across local authorities in the UK. Their main intent is to generate best practice and guidance, to facilitate the enforcement of food law by local authorities. LACORS represents local authorities to the FSA and other relevant central government departments and agencies. It is a requirement that local authorities belong to a food safety liaison group, which comprises neighbouring local authorities with responsibilities in food regulation. The liaison groups examine and discuss local as well as national issues relevant to food safety regulation, and provide support with regards to resolving problems that arise and enforcement of food regulation at the regional level.

National focus groups (NFGs) have also been set up by LACORS. These groups are made up of representatives from local authorities and official control laboratories. NFGs present and address issues raised by regional liaison groups centrally. They also make an input into the formulation of guidelines for local authorities, and the outcomes of any discussions at the national level are proactively disseminated among local authorities (FSA et al., 2010).

The organisational arrangement for food safety assurance fits the model of an integrated agency system. Even though different government institutions are responsible for different levels within the food system (national, regional and local), and involved in different functions (e.g. policy formulation, coordination and training), there is an autonomous agency specifically set up and given the responsibility for food policy formulation, risk analysis, development of food standards, coordination of food control activities, *inter alia* (see section 3.3.3.3). Inspection and enforcements within the context of food manufacturing is undertaken by local authorities, and education and training is achieved through the joint work of local authorities and the private sector.

All the above named institutions work together to improve the consistency and effectiveness of official controls relevant to food safety. Roles and responsibilities are clearly defined, and institutions have been mandated to either define Codes of Practice or develop frameworks and protocols to achieve the aims of regulations.

6.5.5 Operational Mechanisms

The arrangements for coordination and co-operation specific to the enforcement of food safety and standards legislation is laid out in the Food Law Codes of Practice and associated Practice Guidance[24]. By virtue of the powers given to the Secretary of State under section 40 of the Food Safety Act, 1990, regulation 24 of the Food Hygiene (England) Regulation 2006, and regulation 6 of the Official Feed and Food Controls (England) Regulation 2006, Codes of Practice has been issued.

The Codes of Practice detail instructions and criteria that local food authorities are expected to comply with, in the execution of their duties.

The Codes of Practice outline among other things (FSA, 2008):

- liaison arrangements relevant to food authorities and the division of their roles and responsibilities;
- procedures for the exchange of information on enterprises among food authorities;
- procedures and requirements for communication between the Agency and food authorities, regarding Food Alerts and the means of communication;
- procedures and principles to guide enforcement, and guidance on how to apply food law in the context of the guiding principles;
- interventions that apply and the different circumstances in which they may be used; and standards for sampling analysis.

The FSA has issued of a Framework Agreement on Official Feed and Food Control which provides the Agency with a mechanism to determine and oversee local authority enforcement activity. The framework sets out the Agency's expectations from local authorities with regards to the delivery of official controls on feed and food law, and is based on existing Codes of Practice. To ensure that the national priorities and standards are addressed and delivered locally, service plans are used to help local authorities, focus on key delivery issues and outcomes; provide a means of monitoring and evaluating the performance of food authorities; making accessible information on

[24] Separate but parallel codes/practice guidance applies in each of the four UK countries.

an authority's service delivery to stakeholders, including enterprises and consumers, among other things.

Local authorities are allowed flexibility over how to deliver official food controls; however, the service plan needs to set out how and at what levels official food controls will be delivered, in conformity with the Codes of Practice.

Food authorities are required to consider both the Codes of Practice and the Framework Agreement on Official Feed and Food Controls when discharging their duties, otherwise their actions and decisions may be challenged (FSA et al., 2010). Other guidance documents are regularly developed and issued on a variety of topics relevant to food safety, including the introduction of new legislations, for local authorities.

Official laboratories are managed through an accreditation process, with requirements based on appropriate and specified European Standards (Regulation 882/2004). Accreditation is undertaken by the United Kingdom Accreditation Service (UKAS), to the scope and audit requirements defined by the FSA, in liaison with the representative body for most food control laboratories in the UK, the Association of Public Analysts (APA), and the Health Protection Agency. The relationship between UKAS and the FSA as regards the requirements for accreditation, and the assessment and audit of the control laboratories, is managed using Agreements.

'Control bodies' are managed through accreditation to appropriate and specified European Standards. Tasks awarded to control bodies are accurately described, and evidence is required to demonstrate the competence of control bodies, impartiality and lack of conflict of interest in respect of functions required. Standards and procedures for communication of results to competent authorities are also clearly outlined.

To ensure consistent and coordinated trading standards and food enforcement services, schemes (e.g. Home Authority Principle and Primary Authority Scheme) have also been implemented. These helps local authorities work together with food enterprises. The schemes clearly establish lines of relationship and oversight for local authorities, particularly in circumstances where a food enterprise has more than one

branch in different local authority areas. It is expected that these clear lines of responsibility and jurisdiction will ensure that no overlaps exist, with regards to the execution of food safety regulatory functions and ensure the effective use of resources.

6.5.6 Operational Delivery Performance

The FSA is a government department and hence is accountable to the UK government through the secretary of state for health, and the health ministers of the Scottish Parliament, National Assembly for Wales and Northern Ireland. The agency is governed by a board, which is responsible for the FSA's overall strategic direction within the context of the Food Standards Act 1999. The day-to-day operations of the agency are managed by its chief executive. The FSA makes public commitments about its objective, and during open board meetings the executive reports back to the board on progress on achieving them. The agency recognises the role effective evaluations and post-implementation reviews play in the improvement of the work of the Agency, as an independent regulator. Therefore, there is currently a planned development of an operations annual review, which will be independently scrutinised and published (Rhodes, 2011). The focus of the first review is on operational delivery of official controls for the meat premises; however, the FSA aims to roll-out the initiative to encompass all other operational delivery in the future. It is hoped that the involvement of independent reviewers and publishing of the reports will give relevant stakeholders confidence in the operational performance of the agency, in accordance with its strategic objectives.

The FSA has various statutory powers with respect to the monitoring and auditing of the performance of the authorities that enforce the legislations for which it is responsible (see Food Standards Act, 1999 and the Official Feed and Food Control Regulation, 2006). Systems have been set up (e.g. A Local Authority Enforcement Monitoring System (LAEMS)) which allow the agency to collect key data on how each local authority is delivering official controls (FSA, 2010b). The data collected is then

aggregated under pre-defined categories by the FSA, and their accuracy is confirmed by local authorities, before evaluation and publication by the FSA.

Based on these same powers mentioned above, Audit Schemes[25] have also been set up by the FSA, which aim to assess the performance of local authorities against specific standards, and identify good practice to be disseminated. The reports of these audits are published on the FSA websites, with action plans for local authorities, in accordance with its transparency policy. Follow ups on the implementation of audit action plans are made normally after 6 months, and updated action plans are again published.

The Framework Agreement requires local authorities to implement procedures that allow them to assess the quality of their performance against the Standard (FSA 2010b); and these may include the use of externally accredited or self assessment models. To ensure that local authorities are consistently performing to high standards and planned intervention programmes are working as per the service plans, the Framework Agreement also incorporates a requirement for review.

Contracts or Service Level Agreements between competent authorities and control bodies are the main means of ensuring that conditions and standards of performance are met. In addition to this, control bodies are subject to audits by competent authorities periodically.

A relicensing framework and assessment criteria was set out, against which Improve (and other Sector Skills Councils-SSC) were evaluated, to ascertain their capacity and capability to deliver their core remit (UKCES, n. d.) The evaluation was used by 3rd party assessors to scrutinise all proposals submitted by SSCs and the evidences provided to support applications for relicensing.

6.5.7 Values

The statutory regulatory, institutional and policy frameworks guiding food safety in the UK have gone through a series of reforms. The UK regulatory environment continues to change, with new developments in technology, new and emerging risks, consumer

[25] EC Regulation 882/2004 requires that competent authorities are subject to audits.

demands (Hampton, 2005), and the nature of response of enterprises to enacted regulations. Civil society has increased expectation that regulations can and will address all problems associated with protecting consumer health and safety.

Regulators and policy makers on the other hand realise that regulations can address problems related to consumer health and safety, however, it is not without costs (BRE, 2010). They also recognise that regulations have the capability to be ineffective in achieving intended outcomes if their impact on the system being regulated has not been carefully considered and thought through (BRE, 2010); and hence it is essential to consider more critically the appropriateness of the use of regulations.

In 2004, Philip Hampton was commissioned to investigate ways of executing regulatory functions, without compromising regulatory outcomes. His review of the current system brought to light the uncoordinated nature of it, the non-uniform application of good practices, overlapping functions, and the lack of underlying principles that could potentially reduce administrative cost and promote effective regulation. He argued that if regulators use the best evidence to design enforcement actions, administrative burdens on both regulators and enterprises could be reduced significantly. Hampton (2005), recommended that the regulatory system and the operations of regulators should be guided by comprehensive risk assessments, as this will help direct regulatory resources where they can achieve the maximum impact on outcomes, accountability, consistency and transparency. In addition, enforcements should be proportionate, and targeted at non-compliant enterprises.

Over the years, these principles have been approved and adopted by the UK government, and have become the hallmark of the food safety assurance system in the UK food and drinks sector (FSA et al., 2010; FSA, 2010b, FSA, 2008; Hampton, 2005).

In addition to these principles, regulatory impact assessments (RIAs) have also become an essential part of food safety regulation in the UK. Even regulations enacted by the EU, which apply in the UK, are subject to RIAs. For regulations introduced to address risks imminent on chain actors, without RIAs, performance reviews may be conducted to verify performance after implementation.

Current developments, particularly since the coming into power of the coalition government in 2010 are still in accordance with earlier values guiding the UK regulatory system, with the initiatives fashioned to move towards the use of classic regulation only as a last resort. The objective of the coalition government is being made operational through statutory structures to ensure that alternative approaches are considered. A new regulatory decision making structure is being implemented and new rules are coming into force: e.g. the One-in, One-out rule and sunset clauses for new regulations (BRE, 2010). Existing regulations are also affected by these new values, with the new rules requiring e.g. post-implementation reviews, and sunset provisions. Where alternative approaches are not feasible, the aim of government is to ensure that the design of the regulation and the manner in which it is enforced does not impose unreasonable administrative burdens on industry.

The FSA's framework for policy making (2010a) is very much in accordance with these new developments (FSA, 2010a), with the agency aiming to use among other initiatives, an evidence-based approach to meeting its objectives. The principles enumerated above are applied by the FSA and food authorities through a variety of means:

- Risk assessments form the basis of policy formulation and decision-making, by the FSA. Control and enforcement activities are based on the same principle; enterprises that persistently break regulations or are not compliant are identified, and these face proportionate and meaningful sanctions. On the average, food manufacturing and processing enterprises are visited every 22 months. Other stakeholders within the value chain are visited less frequently (Table 6-2).
- The central agency, FSA, operates an open system, through a variety of initiatives, to ensure transparency. Information and advice provided to others, and records of decisions are made available to interested parties (e.g. consumers and chain actors) to explain the rationale behind decisions, and this engenders trust between the agency and chain actors.

Interested stakeholders are given the opportunity to participate in the policy-making process, through consultation, and their inputs are taken into account, after thorough examination of debates.

Table 6-2 : Frequency of official control

Official Controls 2007	Manufacturing. & Processing	Distribution	Retail
Average inspection frequency	22 months	4 yrs	2 yrs & 10 months
%premises subject to informal enforcement	34%	12%	20%
% premises subject to formal enforcement	2%	1.0%	0.70%

(Source: FSA)

- To ensure transparency and accountability of local authorities, service plans are submitted for approval to the relevant member forum of elected members or councillors.
- Official controls by authorised officers are required to be reasonable, consistent but proportionate, and based on good practice. In ensuring this, authorised officers are expected to take account of the full range of enforcement options available and take action based on a graduated basis. That is, advice or education and informal action, and only apply more formal action where informal action does not achieve compliance (FSA, 2008; FSA, 2010a).

6.5.8 Resources

In order to continue to ensure that food manufactured and sold in the UK is safe, the resource needs of the FSA from 2010 are set at £135m (breakdown on the area and the percentage amount of the total resource needs is seen in Figure 6-6).

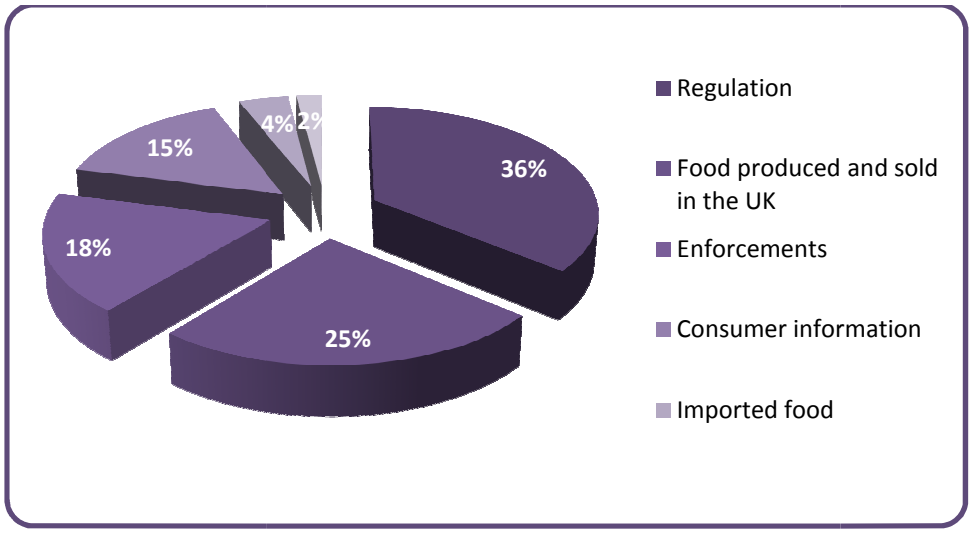


Figure 6-6: FSA's resource needs to achieve strategic objectives

(Source: FSA, 2011)

6.5.8.1 Human Resources

The importance of a skilled and competent workforce for food safety assurance is reflected in a number of documents: e.g. Codes of Practice, Framework Agreement, National Control Plan, and the Food Safety Act, 1990. Provisions have been made in the Food Safety Act (1990), which allows the FSA to undertake educational or training activities. The Code of Practice also requires food authorities to ensure that their enforcement officers for specific food control functions have qualification and certifications awarded by recognised awarding bodies, as detailed in the Code of Practice.

Low cost training programmes are provided to continually update the quality of local authority food law enforcement officers (FSA, 2008). Officers authorised by food authorities are required to be suitably qualified, experienced and competent. Ongoing, structured training to explain new legislation, procedures and technological development relevant to enterprises are implemented for authorised officers.

Developing capability for food safety assurance is ensured essentially through training. The government and the private sector play a significant role in ensuring that

enterprises have the appropriate level of knowledge, and skills set commensurate with their job activities (also see section 6.5.3).

6.5.8.2 Financial Resources

Funding for the control activities of the FSA are provided by the UK Parliament, Scottish Government, Welsh Assembly Government and Northern Ireland Assembly (FSA, 2011). Because the agency is a government department, the entire budget (see section 6.5.8) is funded by government. Funding needed to continually support the various control activities of other food authorities is partly provided through a grant from central government, known as the 'Revenue Support Grant'. The FSA also provides funding for local authorities to establish and support particular and targeted enforcement activities, such as the application of new legislation, investigation of food fraud and the promotion of FSMSs (FSA et al., 2010). Local authority regulatory services are also funded partly through council tax[26].

Improve is funded by government through UKCES, and the funds are expected to be used in accordance with government's strategic policy agenda. Government policy agenda is influenced by the potential need to e.g. drive economic performance in a particular sector, increase productivity performance, create jobs and ensure sustainability of the economy. At the same time, government sees its role in the market as addressing market failure. Accordingly, government funding initiatives address areas where government believes that the market has failed. On the basis of the data collected, government does not see food safety as a market failure, in terms of providing funding for food safety capability development at the enterprise level. Furthermore, the basic minimum qualification for food safety (level 2 food safety) recognised by industry is seen as a regulatory requirement, and hence government does not fund it. The belief is that food safety does not drive growth or productivity performance; it is a capability that should be inherent in food businesses, and hence developing capability to comply should be principally the responsibility of industry.

[26] See National Food Control Plan for arrangements for other parts of the UK

Exceptions apply however, because government recognises small businesses as market failure. The view is that SMEs train less and are less likely to be beneficiaries of training initiatives implemented by bigger enterprises. In other words, the system has failed SMEs. Therefore funding initiatives may be targeted at SMEs, which are also the group of chain actors struggling to comply with food safety requirements.

Some government funds are indirectly directed at enhancing the capability of enterprises for food safety assurance. Improve secures funding from government after demonstrating that the food and drinks sector has potential for growth and economic development. Such funding is made available to training providers, who in turn make it available to industry on a first come first serve basis. The funds are not specifically for food safety, however, many of the qualifications for the food and drinks industry have food safety as an integral part, and hence enterprises receive food safety training while receiving training for other qualifications.

Another means for funding food safety capability development at the enterprise level is through regional initiatives. Some regions may decide that SMEs in their region are a priority, and hence secure funding and use it specifically for food safety capability development, if found to be needed.

6.5.8.3 Information Resources and Communications Infrastructure

The UK participates in the Rapid Alert System for Feed and Food (RASFF). Through this system, regulators get information relevant to the GFMVC. The information gathered from the system is disseminated to industry, and also used to formulate action plans to protect consumer health and safety.

A variety of systems are used to deliver information and facilitate communication amongst the agency, food authorities, enterprises and consumers. Communication activities facilitate the dissemination of information on e.g. food safety incidents, product recalls, food alerts, to let relevant stakeholders know the problem, have details of appropriate and specific actions to be taken. Mediums such as: a dedicated enforcement portal on the FSA website provides a single point of access to

enforcement-related information for enforcement officers and industry, press release/media statements, to enhance local publicity (FSA, 2008).

Information on requirements for key export markets for UK products are published on the website of the FSA, and links are also provided to facilitate the access of relevant stakeholders to information that may be of interest to their business.

Regular alerts are also delivered via emails to food enterprises and consumer, to inform them of contaminated products and products that are being recalled due to breach of food safety regulation. Private sector institutions also play a significant role in delivering information on regulations, and the food chain in general to enterprises, to inform their decision making.

6.5.8.4 Laboratory Infrastructure

As mentioned in section 6.5.3 control officers are supported in the execution of their regulatory functions by official control laboratories. They may support the work of the central competent authority or local authorities. A list of all official laboratories designated by the central competent authority, FSA, is published on the FSA website. Food manufacturing enterprises may chose to use the laboratory services of these designated official laboratories or other laboratories.

6.6 Status of Food Safety and Food Safety Assurance

Ensuring that food manufactured and sold in the UK is safe sits amongst the priorities of the UK government, as is demonstrated by the strategic response of the country to food safety. A variety of institutional arrangements and mechanisms have been implemented to ensure that food is safe; consumers have confidence in the food safety system, and are protected from food hazards.

A performance review has not as yet been conducted, to verify if regulations implemented are functioning effectively; however, general analysis by the Strategy Unit in 2008 suggested that food safety was at a historic high, because food is safer than it has ever been (Strategy Unit, 2008). It is believed that the institutional

arrangements and mechanisms implemented by government, and the response of industry as a result, have positively impacted on the safety of manufactured food.

Consumer confidence in institutions protecting public health and safety has increased (Strategy Unit, 2008). The same can be said for consumer confidence in mechanisms of governance and control. Consumer confidence in current food safety measures peaked in 2005; 55% of people surveyed said they were fairly confident and 7% said they were very confident in current institutional mechanisms controlling food safety (Figure 6-7). This means that from the year 2000 to 2007, consumer confidence rose from 48% to 60%. This is vital because it has severe economic consequences (e.g. ensuring proper functioning of markets).

The concerns of the general public about key elements of food safety have also decreased. In 2008, 71% of people surveyed by the FSA reported that they were concerned about food safety issues (DEFRA, 2008). The general public concerns reduced by 7% in 2009 (DEFRA, 2009). Among the consumer concerns, food poisoning ranked highest on the list, at 52% in 2009 (Figure 6-8).

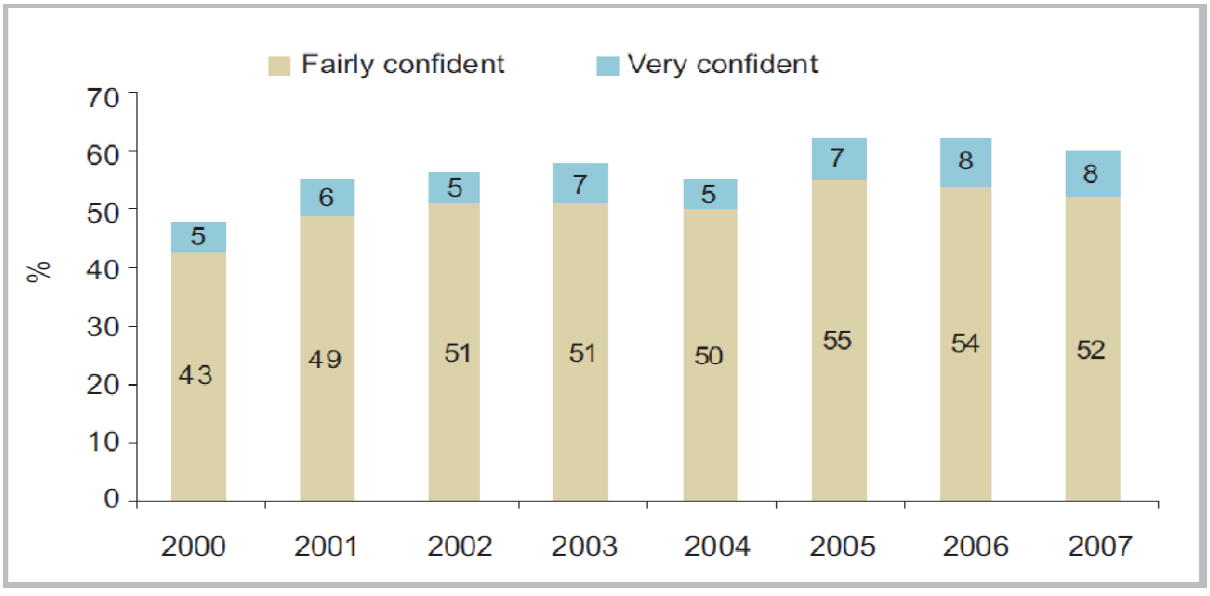


Figure 6-7: Consumer confidence in current food safety measures -2000 - 2007 (DEFRA, 2008)

Between 2000 and 2005, a 19% reduction was realised in the number of reported cases of food-borne illnesses and this resulted in a benefit in terms of socio-economic

impacts, estimated at 750 million over this period (FSA, 2007). This could potentially reflect costs that would otherwise have been incurred due to food safety failures related to food-borne illnesses, if interventions had not been implemented.

Unfortunately, a price cannot be put on some of the costs of food-borne illness, particularly deaths. Meanwhile, food-borne illnesses account for 500 deaths per annum in the UK. According to the Strategy Unit (2008), food poisoning is still a significant issue, even though it is less of a problem now than it used to be; the science of food safety has not as yet provided comprehensive solutions to some of the endemic problems, particularly with microbiological contamination (Strategy Unit, 2008). However, the true scale of the problem in the UK cannot be appreciated because most food-borne illnesses go unreported.

Contaminated food presents a risk to consumers. This means that improved detection rates, identification of sources of risk and a quick withdrawal of contaminated products from the market also ensures that potential adverse consequences on consumers are prevented. Available evidence suggests that more and more commercial consignments arriving at UK ports are detected and rejected on food safety grounds.

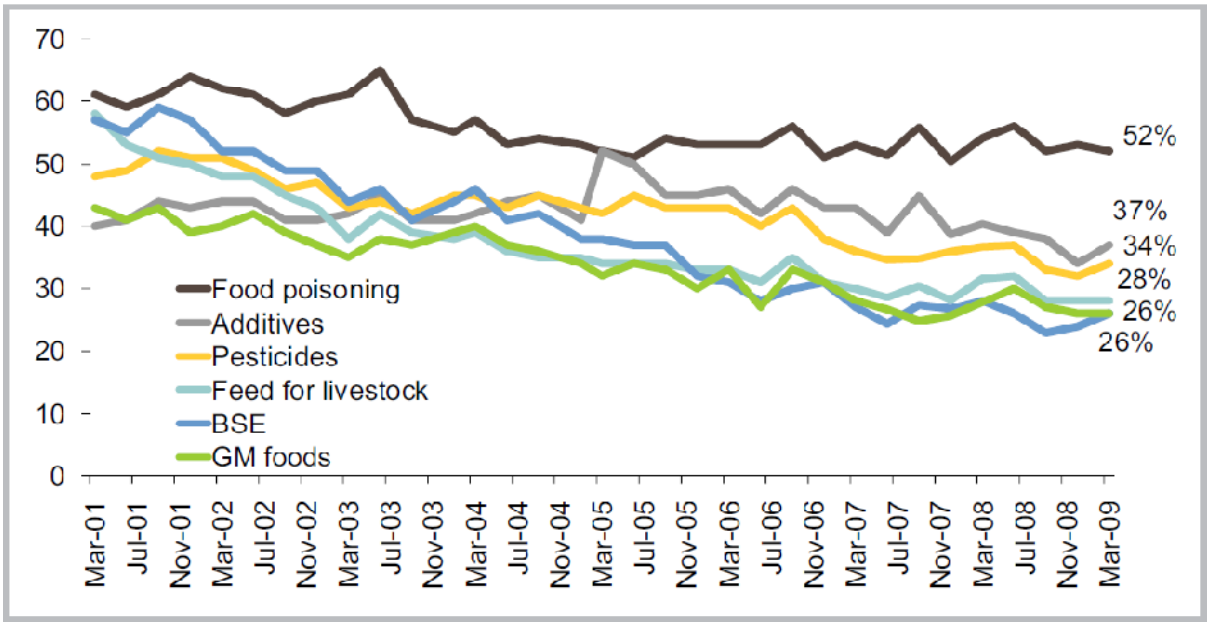


Figure 6-8: Consumer concerns about certain food safety issues 2000 -2009

(Source: DEFRA, 2009)

In the domestic market, food products on sale to consumers found to be contaminated are promptly removed from the supply chain, and this reflects an effective traceability system, and a proper, well coordinated partnership between government and the private sector, to protect consumers.

Regulation of food safety is more rigorous than before. There are well established systems in the UK, influenced by the EU, to assess new evidence about existing and emerging risks. That notwithstanding new regulatory challenges and public debates still linger on as developments in science and technology transform what is possible and available in food production, processing and packaging, and the policy makers continue to look for alternative means to statutory regulation.

6.7 Results from Empirical Investigations

This section merges the findings from the survey and case study at the enterprise level to provide evidence for the response of food manufacturing enterprises, to food safety regulations that apply in the UK, how the mechanisms have impacted on the operations of the enterprise, food safety and consumer protection, and their perception of the feasibility of current mechanisms in use and alternative mechanism to assure safe food.

6.7.1 Profile of Survey Respondents

The European Commission's definition of enterprises (European Commission, 2003), in terms of number of employees was adopted to classify participating enterprises. Approximately 53% of enterprises that responded to the survey belonged to the SME category (Table 6-3), and 47% were large enterprises. Privately owned enterprises made up the largest of the respondents (Table 6-4).

Table 6-3: Size of enterprises

Criterion	Micro	Small	Medium	Large
No. of employees (X)	X<10	10<X<50	50<X<250	X>250
Total no. of responses	0	7	52	53
% of respondents	0	6.3	46.4	47.3

*6 enterprises did not indicate their enterprise size

Table 6-4: Ownership structure of enterprises

Ownership structure	Total no. of responses	% of respondents
Privately owned	54	48
Subsidiary of a multinational enterprise	28	25
Corporation	17	15
Public-private partnership	8	7
Cooperatives	4	4
Publicly owned	1	1

6.7.2 Overview of Case Study Enterprises

All the enterprises that participated in the case study at the enterprise level were privately owned; five are classified as large enterprises and one is an SME. This seems like a sample that is biased towards big enterprises; however, FoodManCo1 had recently outgrown the SME band, into the large categories of enterprises, and hence was able to provide insights from the perspective of SMEs to complement that provided by FoodManCo5. Three enterprises were wholly domestic, with processing and manufacturing facilities in the UK only, and three had facilities in international markets as well. One of the enterprises falling within the former group, however, serviced international markets with its products. A majority of the enterprises supplied into major retailers and were all certified to one of the versions of the British Retail Consortium's (BRC's) global food safety standard. See Table 6-5 for overview of enterprises.

Table 6-5: Overview of cases

Food Enterprises	Size of Enterprise[27]	Ownership	Global Reach	Products	Markets	Customers	Food Safety Certification
FoodManCo1	Large	Privately owned	A UK manufacturing enterprise, with 57 manufacturing facilities in 10 countries (E.g. Belgium, China, Czeck Republic, Iceland, South Africa, and United States)	Includes coleslaws, dips, soups and sources.	The UK manufacturing facility only serves the UK market.	Mainly major retailers	BRC and HACCP
FoodManCo2	Large	Privately owned	A UK domestic enterprise, with processing facility only in the UK	Mainly Fresh vegetable processing	Exports mainly to Ireland, Holland and Spain as well as other regions of Europe	Mainly major retailers	BRC
FoodManCo3	Large	Privately owned	Wholly a domestic enterprise	E.g. Pies, pasties and sausage rolls	Only supplies the UK market	Mainly major retailers	BRC
FoodManCo4	Large	Privately owned	Wholly a domestic enterprise	E.g. Pasties, savouries, bread and rolls.	Mainly services the UK but also services customers in Spain.	Mainly supply to major retailers	BRC
FoodManCo5	SME	Privately owned	A UK manufacturing enterprise with sister companies in Thailand and Australia and reciprocal manufacturing and technical links in the USA	E.g. specialty sauces, flavoured pellets for stuffing, dry and liquid marinades.	Japan; India; Indonesia; Malaysia; and the Philippines.	Mainly major food service centres and major manufacturers.	BRC, HACCP and AIB
Food ManCo6	Large	Privately owned	Has sister manufacturing facilities in 170 countries.	Includes ice creams, butter, mayonnaise, tea bags and noodles.	The UK plant mainly services the UK market.	Mainly to retailers	BRC and has several other standards developed by the enterprise

[27] Classification based on European Commission's classification of enterprises in terms of number of employees

6.7.3 Enterprise Level Strategic Response

The case study results reveal varying strategic actions, which were generally in response to the strategic choices adopted at the national level. Reactive loyalty was the primary strategic choice. Enterprises (all six) have responded positively to the requirements of regulations governing food value chains in the relevant contexts, by implementing integrated food safety management systems. The enterprises which export to other markets (2) claimed they have implemented the requirements of regulations they reckon are the most exacting and stringent, and this allows them to have consistent standards of food safety across all product lines, but varying degrees of quality. This account was, however, different to the account of FoodManCo4, which has made it a matter of policy not to service orders of potential customers which require standards other than that which it has implemented (proactive exit strategy). Some of the enterprises attempt to influence the procedures and requirements of retailers (reactive voice), and based on the evidence provided, their customers may incorporate their contributions into protocols. With reference to proactive voice, enterprises reported that they are able to indicate their positions on new regulations through relevant sector associations, during the consultation process, and this is the principal means of potentially influencing regulations.

6.7.4 Impact of Food Safety Regulation

Regulatory design, implementation and the manner in which enforcements are achieved affect enterprises. This is reflected in the opinions of food manufacturers on the impact of both private global[28] and domestic statutory regulations on the operations of the enterprise. According to respondents, there are consequences (manifesting usually in the form of benefits and challenges) for the decisions enterprises make, in response to regulations. Enterprises were of the view that the nature of requirements of the regulations that apply forces them to use processes that are evidence-based, so that in the event of crisis, due diligence can be claimed. As a

[28] Enterprises lacked knowledge of the existence of global public regulations (SPS and TBT agreements).

result, risk analysis techniques, which require manufacturers to thoroughly access their manufacturing processes for potential risks, and put in place mechanisms to either mitigate their impact or entirely eliminate them, are used to manage food safety in the manufacturing process. Since the risk of food being contaminated is impacted on by the inputs into manufacturing processes, risk-based approaches are used to manage suppliers[29]; and they are required to use the same means to manage their processes. This has increased the chances of risk detection. Given that retailers are also using risk-based approaches to manage manufacturers (Fulponi, 2006), the whole value chain is principally managed using risk-based approaches, which have proven to be adequate for assuring safe food and consumer protection. And hence there is increased likelihood of producing ***safe food***.

It was unanimously accepted that ***statutory regulation has been the primary driver for compliance***, both in food manufacturing enterprises and retailers. The force to comply for manufacturers arises from two key actors, which are external to the manufacturing process: government and retailers. To avoid conflict with the law, while still running an enterprise, means compliance is the only option. According to enterprises, retailers who occupy an advantageous position within value chains have based their mechanisms of governance on international standards, which are recognised as one of the modes of demonstrating due diligence with statutory regulations. Compliance with international standards has become *de facto* mandatory, if enterprises want to qualify for orders. Accordingly, there is an expectation that food manufacturers adopt such approaches; this helps them demonstrate a certain level of achievement with food safety to their customers. As a result, ***customers are more satisfied with manufacturers.***

In responding to regulations, enterprises expect benefits that go beyond the protection of public health and safety, and customer satisfaction. Some enterprises claimed that they are in business to make profit, and as a result often anticipate benefits that are relevant to meeting this outcome as an accompaniment to outcomes

[29] A section on how manufacturers manage suppliers for food safety purposes is presented in section 6.7.12.

that meet the objectives of statutory regulations. Such benefits were reported to have been realised by some enterprises. Fifty percent of the respondents claimed that regulation has indirectly helped to ***increase awareness and recognition of food safety*** in the whole enterprise; and this has had a ripple effect on the ***confidence and pride of the workforce***. A ***friendlier, trustworthy culture*** has been created and ***transparency*** is increasingly being fostered, through the use of multifunctional teams. Increased awareness means that the workforce is more ready to take ownership of, and accountability for their processes. According to one enterprise,

"Food safety used to sit in the quality department, but now everybody knows that they have a role to play in ensuring the safety of our food products."

FoodManCo5

Two perspectives were reported by respondents in respect of the impact of regulation on the ***performance of operations in enterprises***. One set of respondents claimed that compliance with regulation provides a framework to guide food safety management, and this has motivated the ***use of standardised*** and ***documented procedures***, which provide a source of reference for the workforce. This translates into ***consistency in production processes***, and hence ***consistency in the safety of the food product.*** Consistency in the production of safe food reportedly ***preserves corporate and brand image,*** as it ***facilitates the learning process for the consumer***, which ultimately impacts on decision-making concerning which brands to be loyal to. The other set of respondents had negative sentiments about the impact of regulation on operations. According to those respondents there has been no impact on the performance of their operations. The ***key performance indicators (KPIs)*** commonly used to assess the safety of manufactured food, notably, customer complaints, rejects, rework, and downtime, have rather ***increased***, due to tightened requirements beyond the basic minimum. Furthermore, compliance has made some of their procedures ***very bureaucratic***, and more oriented towards documentation. Particularly, the documentation requirements in a food manufacturing environment characterised by constant changes in a variety of areas (e.g. consumer demand, increasing number of allergens and changes in production and process technologies) is onerous. Increases in KPIs relevant to food

safety are not necessarily a bad thing for business, as it reflects the fact that the systems implemented are working effectively to ensure that a bad product with the potential to negatively impact on sales and ruin the reputation of the enterprise does not actually end up in the hands of consumers. Knowledge and insights gathered from the trends and analysis of the KPIs could actually inform the redesign of operations to perform effectively, to save on costs.

Enterprises were in agreement that in a sense, some ***financial savings*** are made; as the financial consequences for manufactured food not being safe are huge. Financial fines are levied on enterprises as penalties for product failure; and these could be as high as £50 000. These costs further increase with the costs incurred as a result of product recalls, and the food manufacturer takes a significant percentage of these costs, if not all, in most cases. As these costs apply even when suppliers have certifications, enterprises strive to ensure that food safety management systems implemented are efficacious, by applying ***best practice approaches***.

Responding to the different requirements across the food manufacturing value chain creates ***considerable costs and financial burdens*** on enterprises. Harmonisation and the application of a single standard that is recognised by a variety of customers (different branded retailers and different geographical markets) reportedly ***eliminate multiple certification costs*** on enterprises. Financial savings are also realised because costs incurred as a result of regular retailer visits to enterprises have significantly dropped, with ***reduced visits***, and the recognition and acceptance of certificates issued by 3rd parties.

A high emphasis was placed on premiums paid by some retailers for demanding the implementation of procedures beyond the basic minimum. However, on a more general level, enterprises indicated that a significant number of retailers pay the same amounts, even for more stringent procedures, whereas, some respondents also claimed that some enterprises pay proportionate amounts for requiring the implementation of more stringent systems.

Benefits of compliance were also reported in the area of ***market access***. Compliance with food safety regulation reportedly has the potential to qualify enterprises for

orders and enhance their prospects of access to retailers; however, respondents claimed that compliance has not helped to gain more market, but rather facilitates defending and maintaining competitive position.

While most enterprises in one way or the other recognised that there are some benefits to be derived from food safety regulation, as discussed above, some respondents argued that the current state of food safety in the UK would still have been realised without statutory regulation or government interference. According to these enterprises, regulation, especially statutory regulations are unnecessary, bureaucratic, restrictive, biased towards consumers and add no more value to assuring food safety. Yet some of these respondents alluded to the fact that:

"Deciding not to comply or respond to regulations will be a commercial suicide."

(FoodManCo5)

The arguments against regulations were primarily centred on the fact that the food manufacturing sector was so dynamic and regulations make it difficult to rapidly respond to these dynamics and innovations.

6.7.4.1 Food Safety Certifications

The majority (99%) of enterprises that responded to the survey had integrated food safety management systems (FSMSs) implemented. Three enterprises (1%) did not have any FSMS in place; nonetheless, these enterprises had one of the ISO 9000 (quality management system) series implemented. The enterprise was a subsidiary of a multinational enterprise, manufacturing beverages, and had been in business for many decades, and hence had an established market. Ninety percent (90%) of enterprises had a 3rd party certified FSMS implemented. The BRC global food safety standard turned out to be the most popular amongst the different standards implemented by UK food enterprises (Figure 6-9).

Approximately 88% of enterprises had the BRC's global food safety standard in place. Approximately 5% of enterprises had two food safety standards implemented. Ten percent of enterprises had their own version of food safety management system in place. Even though ISO 22000 has been introduced for approximately five years before

the survey, the standard and the IFS were less popular with UK enterprises. Six enterprises were certified to the ISO 22000 standard and three enterprises were certified to the IFS.

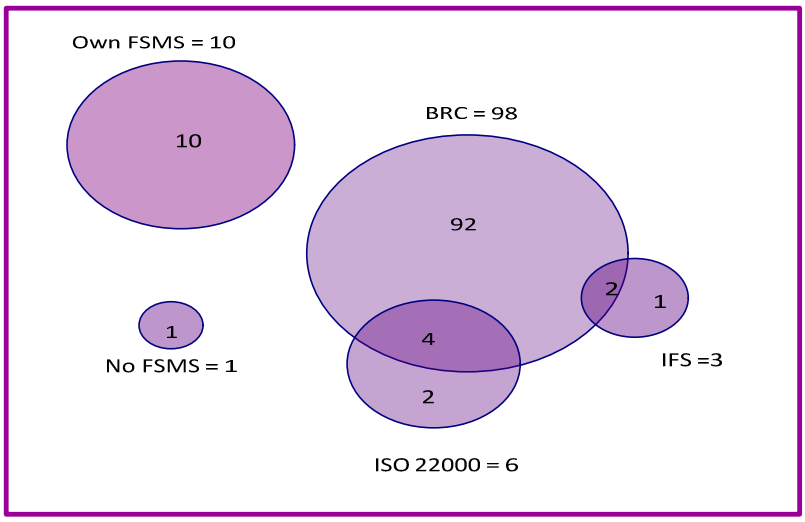


Figure 6-9: Food safety management systems in use in the UK

6.7.5 Motivation for Compliance

Approximately 82% of enterprises claimed that they were driven to comply with food safety regulation by the prospects of product safety improvement, 79% were driven by customer requirements and 61% were driven by regulation (see Figure 6-10). The survey also revealed that 60% of enterprises were driven by the expected marketing advantage. Combining the findings from the case studies and the survey responses on 'motivation for compliance' reveals a discrepancy. 'Product safety improvements' emerged top of the list of 'motivations', with 'regulatory requirement' appearing third; however, the case study investigation reveals that the key motivation for compliance is statutory regulations. Comparing the factors that motivated SMEs to factors that motivated large enterprises revealed two top factors common to both groups (product safety improvements and customer requirement).

A Phi's test (see APPENDIX E) reveals there is no statistically significant difference between the effects of size of enterprise on the motivation for compliance of enterprises.

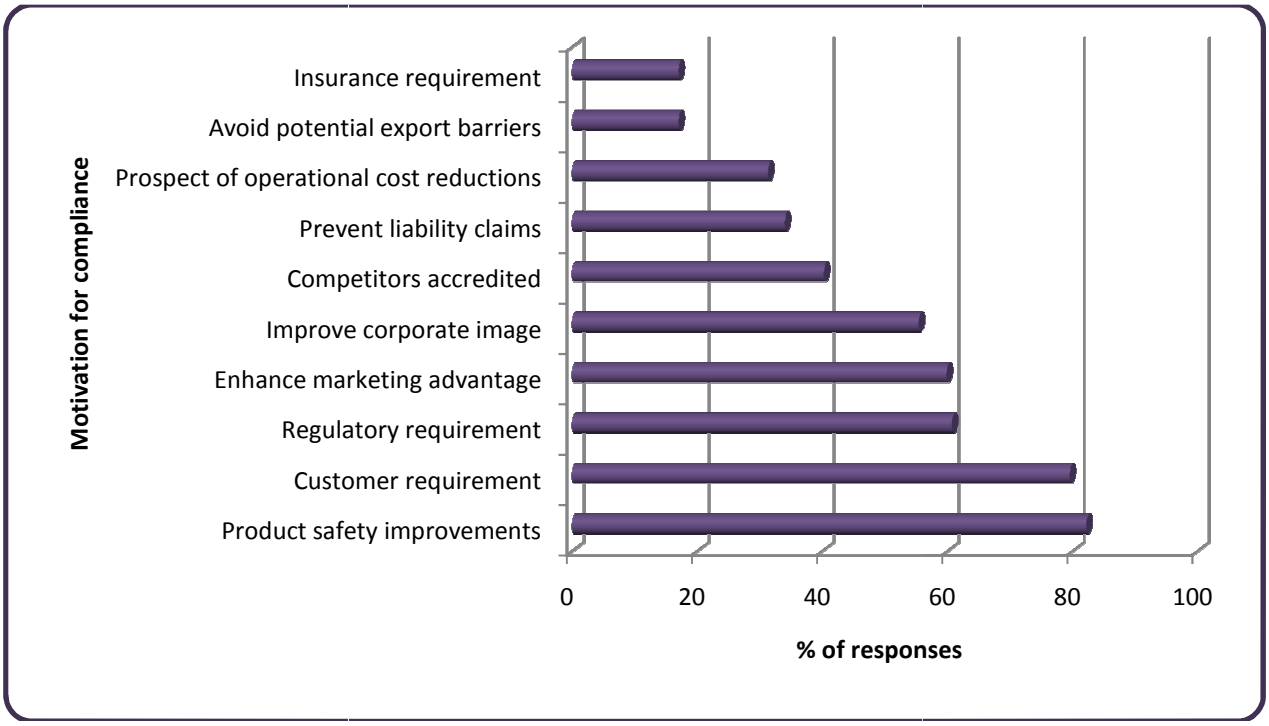


Figure 6-10 : Motivation for compliance

6.7.6 Benefits of Compliance

This study also investigated the perceived benefits of complying with food safety requirements in the UK food and drinks sector. The results indicate that there is a consensus among food manufacturers in the UK, as approximately 99% of respondents claimed that some kind of benefits has been realised from positively responding to regulations (only one enterprise claimed that they have received no benefit).

Approximately 87% of the respondents enjoyed the benefit of increased customer satisfaction. Eighty five percent (85%) claimed improved internal procedures, and 82% also claimed improvements in product safety. The benefits of being compliant with regulatory requirements came fourth in the hierarchy, with approximately 73% of respondents indicating this benefit. An overview of other benefits is presented in Figure 6-11. The results reflects the fact that the top drivers are in accordance with the top benefits, meaning that enterprises gained, as compliance with food safety regulation put them in good standing with both immediate customers and the

statutory regulations that govern both national and global value chains, as well as improvements in product safety.

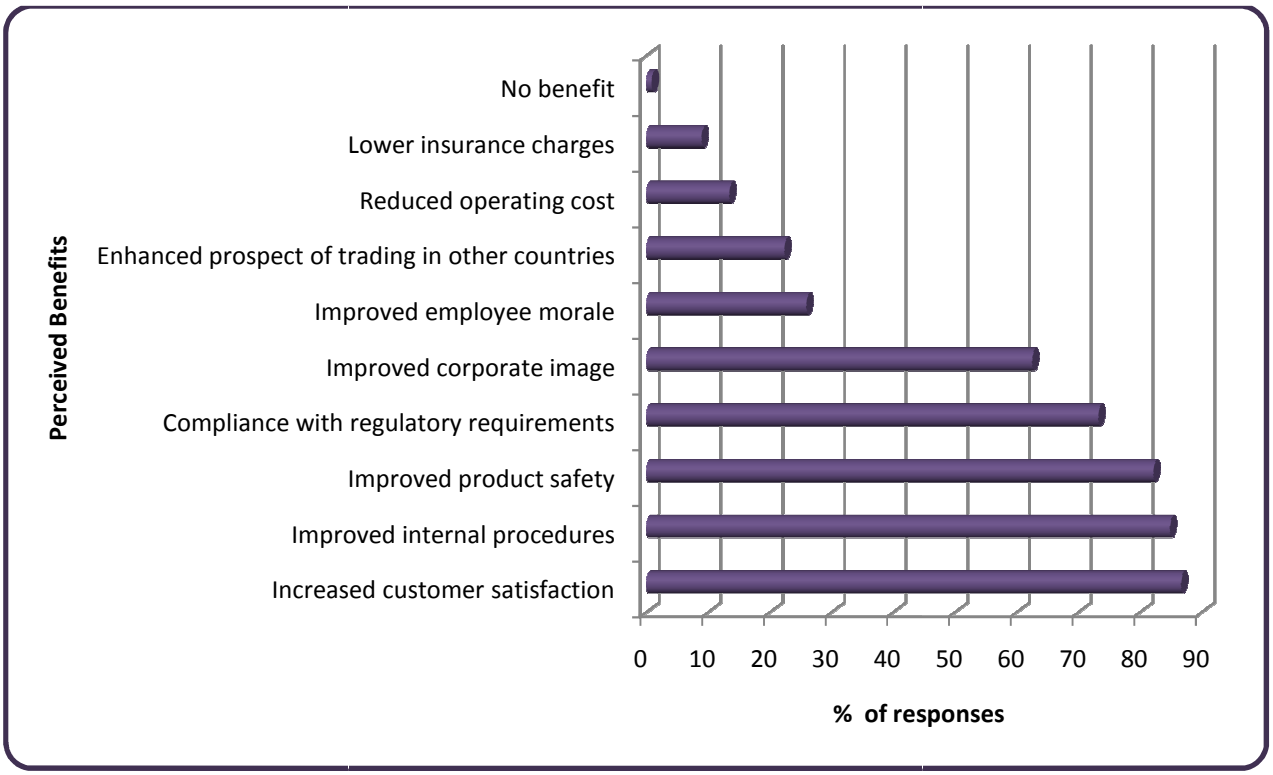


Figure 6-11: Benefits of compliance

The Chi-square analysis revealed no statistically significant effect of size of enterprise on the benefits of compliance. However, one benefit item proved to be statistically significant, 'improved product safety'. This means that, one can say with certainty that size of enterprises has an effect on the benefit item 'improved product safety'. Since Chi-square did not indicate the strength of this effect, Cramer's V (Morgan et al, 2007) was computed to estimate the strength; however, Phi is reported (see section 6.1.3.2). The value was 0.247, which was quite weak. This implies that there is at least an observed difference, which is statistically significant; however it may not be of any practical importance. Among the benefits of the survey, only the benefit of lower insurance charges was not mentioned by case study respondents.

6.7.7 Challenges to Compliance

The internal challenges hindering compliance of enterprises with compliance with regulatory requirements are three-fold financial, infrastructural and people related (Figure 6-13). The external challenges related the rapid changes in regulation (21%) and the fact that there was lack of government support (14%) for compliance (see Figure 6-13 for further details).

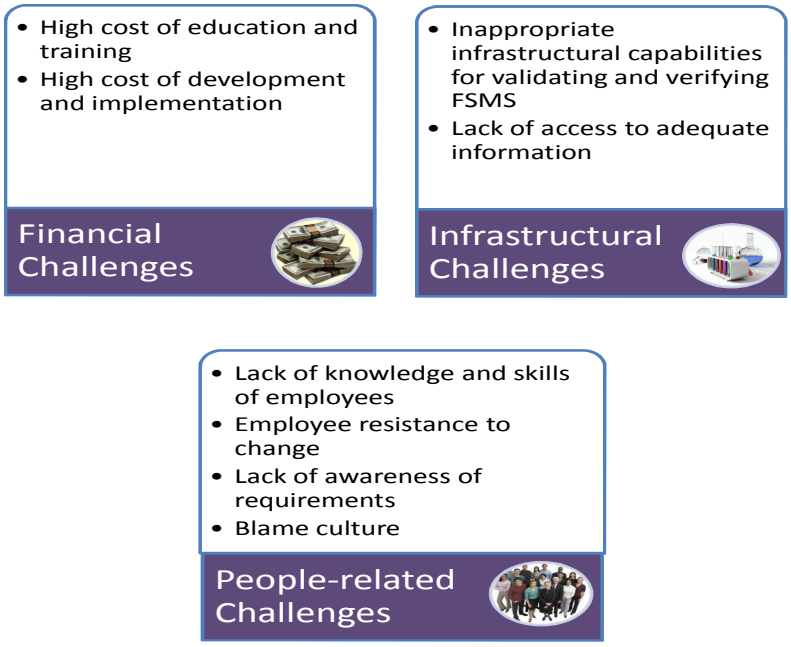


Figure 6-12: Internal challenges to compliance with regulatory requirements

No statistically significant difference was found for the effects of size on 'challenges'.

The topmost challenge enterprises faced in their quest to implement integrated food safety management systems was people related. This is partly attributed to the low level of education and training of employees related to food safety management systems. This challenge is logical as most enterprises (73%) developed and implemented their food safety management systems in-house, making use of their own employees.

As the generic knowledge and competence for manufacturing is inadequate in itself to develop and implement FSMS, a competency gap is created. This gap may create resistant culture, lower morale and sabotage implementation.

This is reflected in the number of enterprises who said employee resistance to change was one of their topmost challenges. In addition to the regular short training courses to increase the knowledge of the workforce on food safety, additional knowledge is required for professionals that maintain and continually improve the food safety system, in the disciplines of e.g. food science and microbiology, and food chemistry.

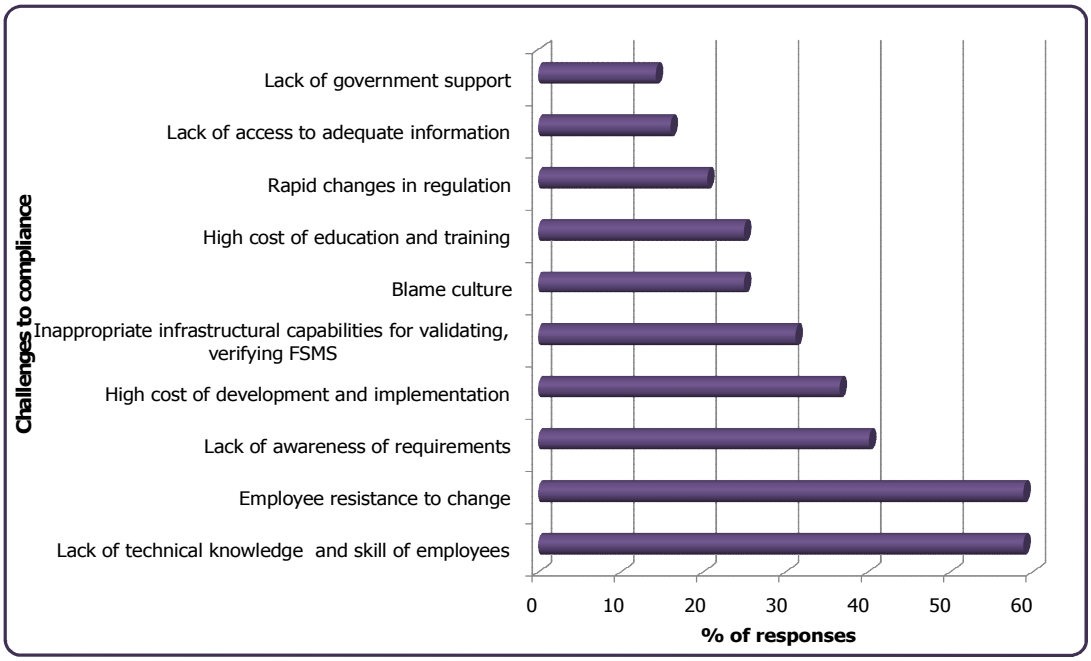


Figure 6-13: Challenges to compliance

However, SMEs cannot afford the services of fulltime professionals with the skills to develop, implement and maintain an integrated FSMS.

The financial related challenges arose from the costs involved in developing, implementing and continually maintaining a food safety management system. Some of these costs arise from the regular refresher training for all staff members and occasional specialised training for specific quality staff. Other costs arise from the regular audits at planned intervals, to determine whether a food safety system conforms to planned arrangements and is effectively implemented and updated regularly. According to enterprises, the most unnecessary of these costs are those that arise from unscheduled customer visits.

A major challenge came from getting the right infrastructural capacity to plan and implement the processes needed for validating control measures, and verifying the

effectiveness of the system developed. Consequently, external agencies are contracted for validation and verification of food safety management systems. Here again, SMEs suffer the most because they are not able to enjoy the economies of scale provided by bulk rates from outsourced laboratory testing services (Loader and Hobbs, 1999). These findings are consistent with the work of Yapp and Fairman (2006), Fairman and Yapp, (2004) and Taylor, (2001) and are valid both in the case of large and small enterprises. However, they are particularly true for SMEs because of their general lack of capability. The survey found out that the challenges faced by larger enterprises are not so different from the challenges to compliance faced by SMEs, however, the limited capability and resources of SMEs makes compliance a heavy burden.

Enterprises agree that the training offered by Environmental Health Officers are more affordable, however, they are biased towards microbiology, which is sometimes not beneficial for all, and hence, an improved, more targeted training, specific to sub-sectors would be more appropriate. Testing the null hypothesis between SMEs and large enterprises revealed that even though in practice there seems to be a difference between these two groups with regards to the elements of 'challenges', the responses indicate that there is no statistical significance difference between the challenges faced by SMEs and large enterprises in the UK.

6.7.8 Mode of Overcoming Topmost Challenge

In response to the open question of how enterprises overcome their topmost challenges hindering compliance with food safety regulation, 40 enterprises (63%) out of the 64 that responded said they implemented interventions that increased the knowledge and competence of their workforce, by increasing their training budget, implementing internal training and knowledge sharing schemes, and developing a training department (See Figure 6-14).

Ten percent of enterprises said they implemented interventions that altered the existing culture within their enterprises. Approximately 8% of respondents said they improved communication in relation to awareness of food safety requirements and how it affects each employee's job description. The remaining percentage (42%) was

accounted for by other respondents who suggested that they invested in equipment and software packages for the management of food safety, implemented standard operating procedures and documented their plan of action to increase the consistency of procedures, which will have a direct impact on food safety in the enterprise.

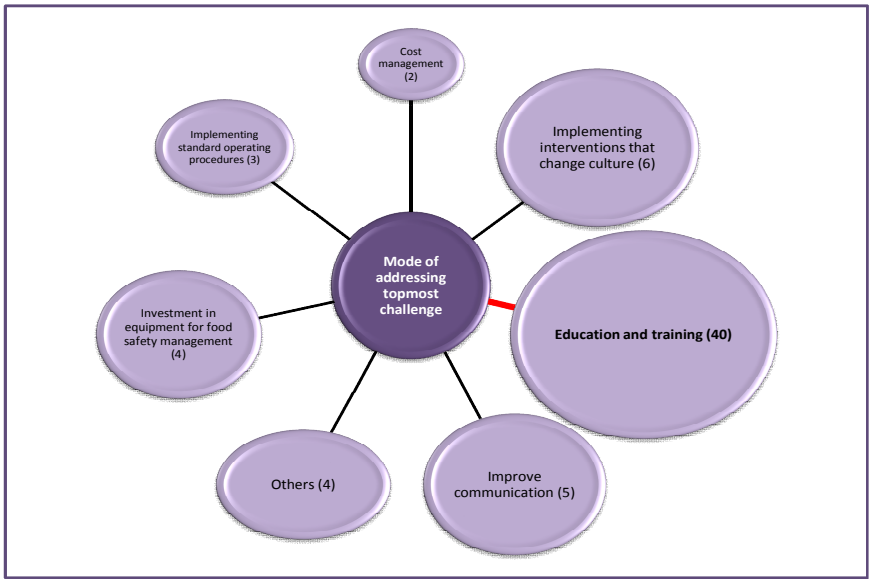


Figure 6-14: Mode of overcoming challenges

6.7.9 Factors Influencing Successful Food Safety System Implementation

The results of the Exploratory Factor Analysis to investigate the nature of the constructs underlying the measured variables in the survey are presented here.

The overall reliability of the scale of measurement was 0.835, and that for individual elements ranged between 0.81 and 0.83, which is sufficiently high (Nunnaly, 1978).

Reliability is the extent to which a question yields the same responses over time, if administered to the same person, assuming that there is no change in the measured variables (SPSS Inc, 1998). It is expected that consistency be observed across repeated responses. In practice, however, asking respondents to fill the same questionnaire twice might put them off, particularly in this time of economic uncertainties, where enterprises are looking to make adequate use of available resources. Given that the survey-questionnaire was administered to a respondent once, the most appropriate

means of assessing reliability was to use an internal consistency statistic, known as Cronbach's alpha.

The Kaiser-Meyer-Olkin (KMO) statistic was 0.833, which indicates that factor analysis is appropriate for this analysis and hence should yield distinct and reliable factors (Field, 2005). The Bartlett test of sphericity, reports a chi-square value 393.5, which is significant, which means that the correlations are better than zero and should contain common variance (Child, 2006).

The correlation matrix yielded item-total correlations from 0.101 and 0.649. Apparently, none of the correlation coefficients were 0 or particularly high (>0.9) (multi-collinearity), or perfectly correlated (singularity), and hence all variables were included in the analysis. A determinant of 0.027 was realised. The yardstick is to have a determinant that is greater than 0.00001 (Field, 2005), and since this is the case for the analysis, it further establishes that factor analysis will yield interpretable results.

The Maximum Likelihood extraction method yielded a four factor solution (see Table 6-6). The first four components explained approximately 49% of the total variance and had Eigen values of more than 1, and hence were selected for further analysis (Field, 2005).

The goodness of fit test yielded a Chi-square value of 19.78, and a significance value of 0.709. This means that the null hypothesis, H_0 (H_0 = the factor solution adequately accounts for the data) is true, which suggests that the factor solution generated adequately accounts for the data is accepted.

Table 6-6: Total variance explained

Factor	Initial Eigen values			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	4.339	36.156	36.156	3.797	31.645	31.645	1.883	15.692	15.692
2	1.280	10.665	46.821	.747	6.222	37.866	1.543	12.858	28.550
3	1.098	9.147	55.968	.693	5.778	43.645	1.453	12.112	40.662
4	1.003	8.356	64.325	.615	5.125	48.770	.973	8.108	48.770
5	.831	6.927	71.251						
6	.693	5.773	77.025						
7	.642	5.349	82.373						
8	.522	4.351	86.724						
9	.508	4.235	90.959						
10	.410	3.421	94.380						
11	.392	3.266	97.646						
12	.282	2.354	100.000						

Extraction Method:

Maximum Likelihood.

Table 6-7: Rotated factor matrix

	Factor			
	1	2	3	4
Employee satisfaction measurement	.816			
Employee reward and recognition systems	.609			
All employees awareness of the importance of food safety of the organisation				
Employee involvement				
Supplier management		.588		
Education and training		.527		
Top management commitment				
Continual improvement				
Culture within the organisation				
Government intervention			.771	
External linkages with learning centres			.508	
Use of standard operating procedures				.805

Extraction Method: Maximum Likelihood.

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 9 iterations.

The varimax rotation suggested an optimum, interpretable four-factor solution, suppressing factors with loadings < 0.5. This loading shows that there are four factors (Table 6-7). Three variables loaded very highly unto three factors:

- Employee satisfaction measurement loaded highly unto factor 1;
- Use of standard operating procedures loaded highly unto factor 4;
- Government intervention loaded highly unto factor 3.

The factor structure suggested by factor analysis indicates that the first factor has two items (n = 2), and they relate to **employee incentive schemes**. The second factor also has two items (N = 2) and that relates to **supplier compliance management**. The third factor has two items (n = 2) which relate to **support form external linkages**. The final factor is '**use of standard operating procedures'**.

6.7.10 Accessing Information on Domestic and International Regulation

On the basis of the data collected, enterprises use five key approaches to stay up-to-date with domestic and international regulations (Table 6-8). The FSA and retailers are a common source of updates on regulations. While retailers would furnish their suppliers with such information as and when it becomes necessary, enterprises have to voluntarily sign-up for regular updates, in the case of the FSA. Enterprises also indicated that other external linkages (e.g. relevant sector associations and Campden BRI), also provided updates on new and emerging regulations; however, some of these sources of updates come at a cost. Subscription fees are paid to some of these external linkages and have to be renewed on a yearly basis. However, engaging with such linkages affords enterprises much more value than just information on new and emerging regulations. External linkages are also a constant source for process and product technologies, advice, current research findings, among other things. A number of enterprises also indicated that they are big enough, and hence have dedicated departments, whose jobs are just to be on the constant look out for regulations with potential impact on the operations of their enterprise.

Table 6-8: Mechanisms for keeping up-to-date with food safety requirements

Mechanism keeping up to date on food safety requirements	FoodManCo1	FoodManCo2	FoodManCo3	FoodManCo4	FoodManCo5	FoodManCo6
FSA	√	√	√	√		√
Local council				√		
Retailers	√	√	√	√		√
Enterprises' own initiative	√	√		√	√	√
External linkages	√	√		√	√	√

6.7.11 Making Operational Food Safety Requirements

The purpose of this section is to present the approach adopted by the enterprises investigated to make operational the requirements of food safety on the shop floor. Because, many of the enterprises had implemented their food safety management systems for many years now, it was difficult to capture the step-by-step processes involved in implementation from scratch. It was more practical to capture how changes in regulations are effected.

Making operational the requirements of regulations in practice requires a holistic system, which draws on the efforts of all employees, from the different levels of the enterprise: top level management, operational level and shop floor. Implementation also involves managing suppliers, managing the value chain internal to the enterprise, and the interfaces that link the manufacturer's value chain to retailers' value chain.

For some enterprises, it is management that pushes for compliance with food safety requirements. Under this particular circumstance, the first hurdle of getting top-level management commitment and involvement would have been overcome. However, for other advocates, it is essential to gain the commitment of top level management as most international food safety standards explicitly state (ISO, 2005). They are required to declare the enterprises policy on food safety, give their backing to whoever will be responsible for coordinating implementation, and allocate resources to facilitate compliance.

The actual process of making operational the requirements begins with preliminary work of getting the relevant regulation, and understanding its requirements and implications for the enterprise. A checklist of what is required against the regulation is then made, and this is used as a guide in the next stage of the process. Process owners are used to develop or update their process charts to ensure accuracy. Internal auditors (who are specifically trained for this purpose) are then educated on the requirements of the regulation and given the prepared checklist to guide the audit. Depending on the size of the enterprise, more than one auditor may be involved in the process. The processing area is demarcated and allocated to internal auditors, and

time scales are allocated. Process owners are made to understand the objective and focus of the project so that they can provide relevant information to each workstation to internal auditors. Five main phases emerged from the data (Figure 6-15).

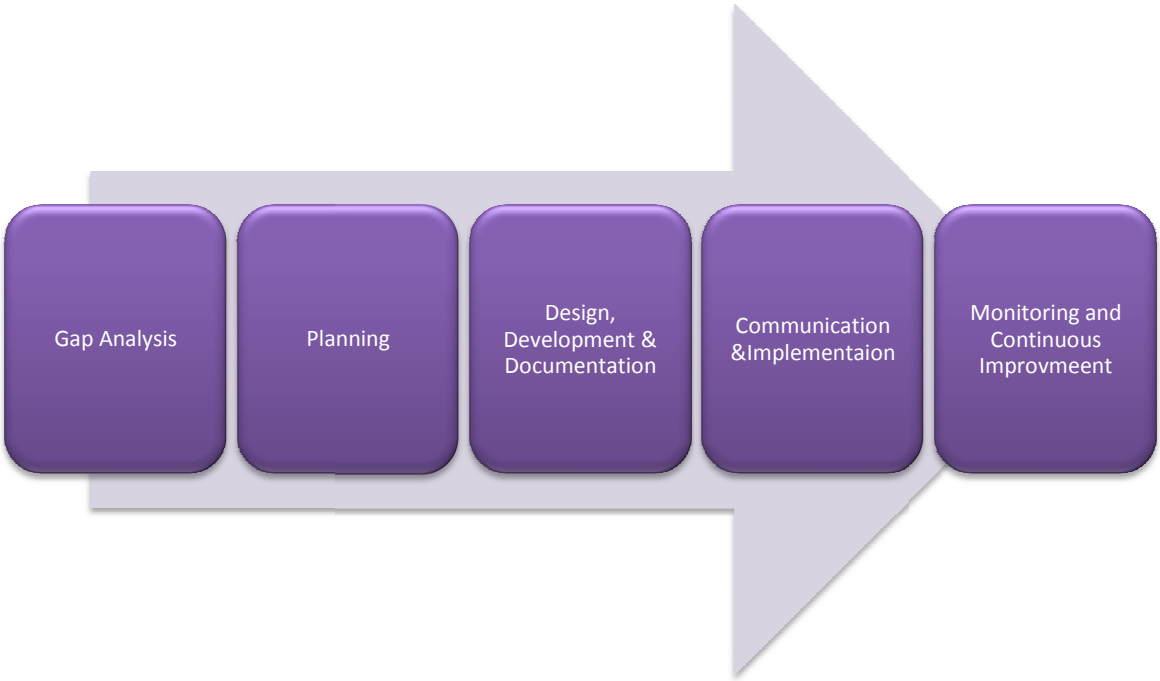


Figure 6-15: Phases of implementing the requirements of food safety regulation

6.7.11.1 Gap Analysis

This stage of the operationalisation process helps to ascertain the current state of the enterprise against the requirements of regulation, and gives an indication of how much work is required to bring the enterprise into compliance. Trained auditors audit e.g. policy, processes, and capability of process owners in accordance with the checklist developed against the regulation in the preliminary stages. With the aid of process flow charts developed or updated during the preliminary stages, auditors check for consistency in the execution of roles and responsibilities, and of the processes, and also ascertain whether all the processes are documented. A system or convention is agreed, which is used to indicate the status of processes against requirements (Table 6-9). The output of the stage or gaps is used to develop an action plan for those given the responsibility to develop and implement the system.

Table 6-9: System of convention adopted for gap analysis

Status of element of gap analysis	Colour Description
In compliance and documented	Green
Incompliance not documented;	Amber
Have some elements in place; partially compliant;	Amber
Non-compliant	Red

6.7.11.2 Planning

The gap analysis helps decide on the project plan and timelines. It is the responsibility of management to declare/update the enterprises' stance in the form of a food safety policy, in conformity with regulations. This policy is documented, signed and managed by the technical director or QA, and becomes the foundation of the message that is communicated to all employees. The food safety policy also guides the development, implementation and continuous monitoring of the FSMS.

The implementation requires a food safety team leader and team to manage the development, implementation and maintenance of the system. The execution of these functions requires specific competences that no foundational degree relevant to food manufacturing alone can adequately provide. In addition, the developers require adequate knowledge and experience of the product in question, to develop a system that is efficacious. Therefore specialised training is required. No single individual or operational department alone has all the knowledge relevant to the product and the processes under review. A multifunctional/multidisciplinary team is hence drawn from the various operational departments, and is often headed by the technical director or the quality manager.

6.7.11.3 Design, Development & Documentation

According to the survey, most enterprises (78%) developed their systems in-house; 20% of respondents claimed their system was jointly developed with a consultant; and 2% of respondents handed over the whole process to a consultant (Figure 6-16). From these findings, a higher need exists for employees involved in the development and

implementation of the system to be technically competent as most enterprises are tending to develop their food safety management systems in-house.

A variety of techniques are employed to equip relevant employees with the competency to effectively design, develop, document and implement an integrated food safety management system. The results from the survey indicate that enterprises may adopt more than one technique to address the skill set gap for personnel responsible for developing and implementing an integrated food safety management system. Employees may be hired with the necessary skill set to develop and implement the system (19%).

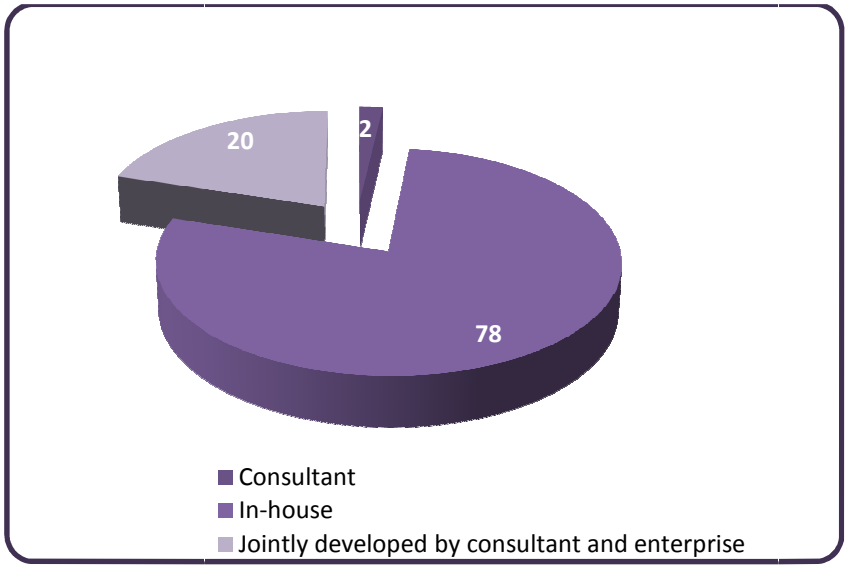


Figure 6-16: Developer of food safety management system

In other circumstances, enterprises may decide to equip personnel through training. In that case, four options are available: In-house training (88%); training personnel on the job (81%), sending employees off to external training centres to train (75%) or mentoring personnel (53%).

Food safety requirements are incorporated into the manufacturing process (97%), the design of the layout of manufacturing plants and equipment (91%), and the design of products (83%). In spite of using new integrated approaches, food manufacturing enterprises continue to use sample testing along production lines (83%) and at the end of the production lines (80%). Integrated process-based approaches to food safety require that the processes that deliver the food product are monitored and controlled;

81% of enterprises use process control techniques to achieve this purpose, with 86% using process audit techniques to assess internal processes.

The design or update should correspond with the actions raised from the outcome of the gap analysis, and must be undertaken on the basis of risk assessments (the CAC's tools of Hazard Analysis and Critical Control Points (HACCP) are often used). The FSMS must then be documented. Prerequisite programmes underpin control mechanisms specified in the HACCP plan, and are designed to tackle generic food safety hazards on the site as opposed to specific hazards, which are controlled by critical control points (CPPs).

6.7.11.4 Implementation

Documented procedures become actions on the shop floor essentially through awareness creation and training. Policy requirements are incorporated into standard operating procedures (85% of survey respondents) and job descriptions (62%). Visual aids e.g. posters and action plans in employee working areas (71%), provide a reference for enterprises when they need it. By adopting a participatory approach (76%), throughout the development process, knowledge is implicitly transferred to employees.

All employees go through an induction programme, which includes awareness creation on the enterprise's stand on food safety, and the role of each employee towards ensuring food safety in the enterprise. The capability gaps of employees relevant to food safety are addressed through training in different practices depending on functions of the different employees and the level at which they are in the enterprise (Table 6-10).

Employee specific needs relevant to food safety are determined through five main means: Performance appraisals emerged as the most popular approach used for determining employee needs (79%); however, this may not be the appropriate approach to adopt in the case of finding out the learning need of enterprises because it is done in hindsight. Products and processes could be compromised before the appropriate skill gaps are identified. As a result, it is not surprising that job/task

analysis (69%) and other approaches (observing individual employees at work – 57%, asking employees to suggest their learning needs – 43%, conducting organisational analysis – 38%) are used to complement this approach to determine the food safety learning needs of employees.

From the table, it is observed that over 70% of all staff are trained in good manufacturing practices, good hygiene practices (these elements are all part of the level 2 food safety qualifications) and HACCP principles, with 100% of quality staff trained in HACCP principles. This is explained by the fact that level two food safety is the basic minimum standard recognised by industry. Consequently, enterprises reckon that with the level two qualification, they can demonstrate that food handlers have had training that is commensurate and appropriate to their job descriptions as required by regulations ((EC) No. 852/2004 on the Hygiene of Foodstuffs, (Chapter XII Annex II)), rather than having to demonstrate competencies.

Training all qualified managers in HACCP is also logical, as most often it is the quality manager who develops and leads the implementation of food safety management systems. It is also observed that above 82% of employees across the remaining categories (operations and production management, supervisors and team leader, other quality staff and shop floor staff) are also trained in HACCP. This is important because the other employees make an input to the design and development of the HACCP manual since they are the process owners and hence are in the best position to accurately indicate the points along the manufacturing process where there is potential for the safety of the food product to be compromised.

Table 6-10: Who is trained in the various elements of a food safety management system in an enterprise

Who is trained?	Operations and production management	Quality managers	Supervisors/ team leaders	Other quality staff	Shop floor staff
	% of responses	% of responses	% of responses	% of responses	% of responses
Good manufacturing practices	96	93	93	84	88
Good hygiene practices	98	98	99	95	98
HACCP principles	95	100	96	82	95
Basic documentation procedures	82	93	86	88	71
Non-conformance management procedures	79	66	65	48	50
Factory facilities management	93	81	62	37	29

6.7.11.5 Monitoring and Continuous Improvement

After implementation, the next activity is to monitor the FSMS to ensure that it is performing effectively. More than 50% of enterprises use five key performance indicators to monitor and track operational performance (Table 6-11). The trend of the performance indicators suggests whether the system needs a revision or not. Ideally, reviews of specific components of the FSMS are done when there are changes in the product or production process, however, there are set times for reviewing each component of the system (see Table 6-12) and conducting internal audits. The audit reports are periodically reviewed by top level management, and feedback on performance incorporated into reviews.

Table 6-11: Key performance indicators for measuring operational performance

Performance indicators	% of responses
Customer complaints related to food safety	96
Goods returned as a result of food safety issues	73
Non-conformance detection rate	71
Customer satisfaction	70
Reject rates on production line related to quality issues	68
Internal failure costs related to food safety	50
Downtime related to food safety	50
Increased sales	29
Response time to out of control processes	21

The continuous improvement of the system is ensured through periodic in-house awareness programmes for employees (80%), and sending employees on periodic external awareness programmes (61%). Approximately 54% or more of enterprises review their HACCP system, prerequisite programmes, and validation and verification procedures once a year (Table 6-12). Critical control and competence tests are occasionally conducted for enterprises to ensure employees have the knowledge to control food safety. Auditors occasionally monitor employees, audit them and produce reports on each individual, which are used to raise actions for workforce not complying with documented procedures.

A training policy is used to demonstrate the commitment of top level management towards the continuous improvement of the knowledge and skills of employees; external trainers are usually invited to train employees and issue recognised certificates. Enterprises claimed that while this formal training, which results in a recognised certificate is good, both as a means of upgrading employees with theoretical knowledge, and to demonstrate compliance with regulations, it does not provide the workforce with the practical skills required to control food safety. In-house training, designed using guidelines of an external recognised training package, which employs role playing, proves more effective. It puts some employees in the position of enterprises and others in the position of retailers, to investigate food safety issues, and this brings understanding concerning the potential devastating impacts in terms of costs, damage to brand image, reputation and possibly loss of business, which could potentially mean loss of jobs.

Trial runs are conducted to verify and validate traceability systems. This is essential in monitoring the effectiveness of traceability systems because retailers require enterprises to identify sources of food safety crisis in the shortest possible time. Because of the significant number of inputs into manufacturing processes and the different processes applied to input materials, manual traceability is usually prone to error, and hence software packages (e.g. MRP systems) specifically designed to manage traceability in industrial processes are used to manage all inputs into the manufacturing process, and to document the path traced by each raw material input. The software packages use supplier and raw material codes; combines them with recipe codes, processing codes, and shift and batch numbers. These are converted into a final code, which is used to trace the final product.

Table 6-12: Review practices of food safety management system elements

Review practices	Less frequently	Once a year	Two times a year	Three times a year	More frequently
	% of responses	% of responses	% of responses	% of responses	% of responses
Review HACCP system	0	54	15	4	14
Review prerequisite programmes	0	55	16	3	12
Review validation and verification procedures	0	51	21	4	11
Review employee training needs	3	48	11	5	20
Review emergency preparedness	6	47	29	3	1
Review food safety management system	0	49	15	4	18

6.7.12 Supplier Management for Food Safety Purposes

The management of suppliers is an integral part of ensuring the safety of manufactured food. It is a systematic process which makes use of risk assessments of prospective suppliers. For enterprises that were not vertically integrated (FoodManCo2 was highly vertically integrated), a combination of two conformity assessment methods (1st and 3rd) or all three conformity assessment methods (1st, 2nd & 3rd)[30] were used to manage suppliers. The survey results indicated that 3rd party certification and supplier auditing (2nd party auditing) emerged top on the approaches used by food manufacturing enterprises to manage suppliers for food safety purposes (84%).

As a first step, prospective suppliers are required to fill a Supplier Assessment Questionnaire (SAQ), which requests information on e.g. allergens on site and standards enterprises are certified to. The information provided is then used to develop risk profiles, which informs the decision on short listed suppliers. Manufacturers expect their suppliers to be covered in the same way that they are covered by the BRC. Some manufacturers recognise that SMEs form part of value chains and as such should not be marginalised. Further, not all SMEs can afford to be certified to the BRC standard, because of costs and other resource constraints; and for some very small enterprises it might not be economically feasible. As a result, Safe and Local Supplier Approval (SALSA) certificates (according to FoodManCo3, it is a baby version of the BRC) may be accepted for domestic SMEs.

A decision on which suppliers are short listed is based on a variety of issues. Food safety certifications play a prominent role; however, it is not a sufficient reason to select a supplier. Consideration of other criteria e.g. evidence of ethical trading practices (subscribing to e.g. the Supplier Ethical Data Exchange-SEDEX); geographical factors (e.g. seasons, proximity to manufacturing plants) also play a significant role. This may mark the end of the process for some manufacturers, particular those without the resources to go and audit international suppliers. Such enterprises rely solely on the BRC certification, and hence the short list becomes a supplier approved

[30] See section 2.2.2 for definition of the various types of conformity assessment methods.

list. For others, a second stage will be auditing the suppliers. According to FoodManCo5, there are so many technical requirements supplier auditing can reveal that a SAQ or 3rd party certificate cannot provide. These technical elements may not be relevant to ensuring safe food, but relevant to the competitiveness of the business and their capability to be responsive. Businesses run with the aim of making money, and hence there is a constant look out for cost-effective deals that will facilitate meeting that aim. Auditing therefore helps to understand the culture within the organisation, which will have implications for response time, reliability of supply, and technical support, among other things. When a decision is made to use a particular supplier, specifications and service levels are agreed, and the deal is sealed with a contractual agreement. From then on, supplier audit frequency is based on original risk assessments. Approximately 77% of enterprises surveyed still check raw materials on arrival.

6.7.13 Influence of Manufacturing Environment on Compliance

The government and the private sector work together to provide support services in various ways that facilitate the compliance of enterprises. The FSA publishes guidelines that interpret statutory regulations into formats that can be understood by food enterprises, and are responsive to calls regarding clarification on food safety issues and advice on compliance. According to one enterprise this is particularly important for SMEs who cannot afford the services of legal aides, because even though some large enterprises are in a position to provide such guidance, they may not have a good due diligence case in the event that crisis evolved, as a result. The visits of environmental health officers were always anticipated; according to enterprises, they were not threatened by these visits because they were confident that they operated at a level of compliance above that which statutory regulations required. It was highlighted that funding is made available to some local colleges and universities through national and regional initiatives to provide recognised training relevant to food safety to facilitate the compliance of SMEs, with a turnover of 30 million or less (FoodManCo2; FoodManCo4). This goes a long way to eliminate some of the considerable costs

associated with equipping employees with the skills and competence to effectively manage food safety.

Food manufacturing enterprises have alliances (See Table 6-13) with a number of bodies, which play a significant role (Table 6-14) in facilitating their compliance with food safety requirements. The availability and number of these bodies ensures competitiveness in the sector, whilst providing a voice for individual enterprises in the regulatory process.

Table 6-13: External linkages

External linkages/Alliances	% of responses
Alliances with sector bodies	82
Alliances with research bodies	67
Alliances with other food manufacturing enterprises	45
Alliances with Universities	31

Table 6-14: Nature of external support for enterprises

Support from industry associations and sector bodies	% of responses
Technical guidelines on developing, implementing and maintaining FSMS	81
Education and training related to food safety	70
Sector trends and other information related to food safety	56
No support	7
Financial support to implement and maintain food safety systems	5

It emerged that the resources in terms of human, infrastructural, financial and social capital cannot be provided by enterprises on their own or even by government alone. This is elaborated in the fact that while some enterprises have their own laboratories, some of which were accredited, and deliver training using internal staff, the availability of third party service providers (e.g. laboratory service providers, training institutions, audit bodies, research bodies) eases the significant burden that would otherwise have been placed on enterprises, and even government institutions, as they also depend on the private sector service providers to execute some control functions.

Third party institutions are accredited and this provides a means of ensuring that the institutions upon which food enterprises depend for support services have the

required skill set, as well as the appropriate physical infrastructure to deliver expected outcomes. Their involvement in the food safety assurance process, given the lack of conflict of interest, introduces a lot of transparency, and fosters trust and confidence in the food system.

Retailers emerged as the principal thrust behind the success of food safety assurance in the food and drinks sector. While statutory regulation remains the key driver for compliance for most food manufacturing enterprises, it is the commitment of retailers to their customers and their consistency in the use of their chosen governance mechanisms that have ensured actual implementation of requirements. Through their efforts, the burden on local authorities and government resources is reduced, as with risk analysis forming the foundation of food control, the frequency of monitoring of enterprises by local enforcement have reduced due to reduced numbers of enterprises that are persistently noncompliant.

The impact of the media network on compliance was also highlighted as significant. According to some enterprises, their willingness and commitment to reporting food safety crisis to the public provides a complementary driving force to statutory regulations and retailer enforcement of private regulations. The negative publicity could be potentially damaging to brand and corporate image, and this could potentially impact on sales.

6.7.14 Alternative Mechanisms to Statutory Food Safety Regulation

It was established that statutory regulation is the principal driver for the compliance of food manufacturing enterprises, even though product safety improvements emerged top of the list of drivers in the survey. The view that there are no alternatives to statutory regulation in practice was emphasised by some enterprises (50% of respondents). This was attributed to the high tendency for enterprises to be profit-oriented and exhibit opportunism. Opportunism is used here to represent the tendency for enterprises to be self-seeking at the expense of public health and safety. According to respondents, the burdensome nature of compliance, coupled with the significant costs involved can deter the compliance of enterprises. This is corroborated

by the comments of two respondents, who suggest that in the past, one could get away with any practice; however, statutory food safety regulation means that people are demanding information on production processes, the nature of raw material inputs and more generally, what goes into manufactured food.

The main objective of this section was hence to investigate from the perspectives of enterprises, if there were alternative mechanisms to statutory regulation, with the potential to enhance the compliance of enterprises, in the way that is realised in the UK. The overview of responses represented suggest, ***private regulation*** by retailers and other private institutions ***(self-regulatory approaches)*** as a more viable approach to enhance compliance; and the exploitation of ***consumer power,*** through increased disposable income, ***education and information*** provision to consumers, to allow them to influence compliance with food safety requirements through their buying patterns (Figure 6-17).

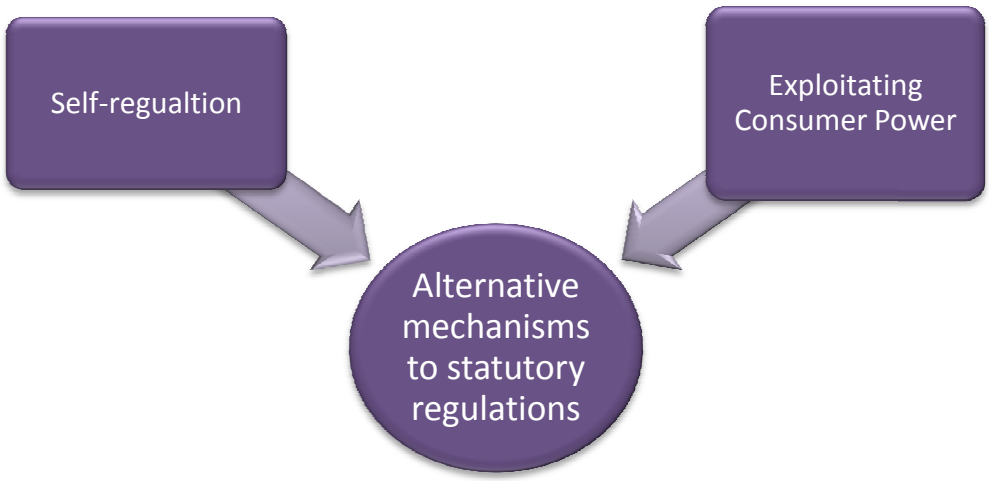


Figure 6-17: Alternative mechanisms to statutory regulation

6.7.14.1 Self-regulation as a Viable Option

Statutory regulation in the UK reportedly has minimal impact on the actual compliance of enterprises. According to views expressed, statutory regulation is only a springboard to compliance. Environmental health officers (EHOs) visit rarely (on the average once a year) and are sometimes invited to undertake training services for enterprises, but have less of an impact on ensuring the compliance of enterprises. The governance of

the food system is actually being delivered by retailers, and third party institutions, as they have the power to make the real changes; as a result, private regulation is a more feasible option to enhancing compliance. The concern raised with this approach is that not all relevant stakeholders may buy into the arrangement, and hence unless some sort of policing system and penalty for non-compliance is implemented, compliance may not be realised. This view is in harmony with suggestions of Sinclair (1997) and Venturini (2003).

6.7.14.2 Exploiting Consumer Power

Consumer power was seen as one of the viable options to enhance compliance with food safety requirements in value chains. It was reported that consumer disposable incomes have grown substantially and this has given power to consumers to make choices and influence food safety. However, one enterprise alluded to the fact that it is a more pragmatic option in contexts where government and industry have not got the needed resources to implement more defined approaches. The lack of technical knowledge, information and relevant education of consumers was highlighted as one of the factors that inhibit proper working of this approach; consequently, success will depend on the availability of the technical knowledge and information made available to consumers.

6.8 Chapter Summary

This chapter set out to investigate the institutional arrangements implemented in the UK to assure food safety, and the response of stakeholders, particularly food manufacturing enterprises to the mechanisms implemented. Furthermore, the impacts of mechanisms applied on food safety were also explored.

The current food safety assurance system in the UK has gone through a series of reforms, and matured over time. The system is flexible, yet highly structured, well documented and published. The principles guiding the food safety system reflect the fact that the national shared values do not tolerate risk and uncertainty. A regulatory system has, therefore, been implemented, strictly enforced and monitored by

regulators. The regulatory system is developed on the basis of transparent, independent, scientific evidence and advice, and on principles that ensure effective use of resources. Up-to-date, timely and relevant information to all relevant stakeholders is what the system thrives on. This is one of the key reasons why it is effective. The availability of information ensures that participants in the domestic value chain (including regulators) are held accountable for their actions.

There is minimal political interference, and the independent regulator mandated by law to regulate food safety coordinates food authorities to ensure effective execution of assigned regulatory functions.

The current system has been influenced by a variety of factors. In the domestic market, the food safety crises that hit the UK in the 1980s and the costs in terms of health care services, and the loss of human lives have been significant influential factors. Furthermore, the role of consumer pressure and the advancements in process and product technologies cannot be underestimated. Even though the nature and content of mechanisms used were primarily based on the factors mentioned above, global and regional requirements have also played a prominent role.

The compliance of industry, in general, with food safety requirements has been driven by statutory regulations. The basic law upon which other secondary regulations are based, incorporates a requirement to demonstrate due diligence. Secondary regulations require food safety management systems to be based on HACCP, and put a duty of care on food businesses and their employees to ensure food safety. The efforts of government have seen an increased responsibility of major stakeholders in the UK food value chain. Retailers have been incentivised to rethink the governance approaches applied to enterprises. They insist on integrated process-based approaches to food safety management from suppliers, and require all their suppliers and prospective suppliers (regardless of geographical location and size) to be certified to an international food safety standard. Even though statutory regulations do not specify the nature of response of enterprises that constitute the practice of due diligence, industry has taken the initiative to define its own standard. Certification to international food safety standards is recognised by industry as the key mode of

demonstrating due diligence. Furthermore, level 2 food safety is recognised as the basic minimum qualification to demonstrate that food handlers have had commensurate and appropriate training to their job descriptions as required by Regulation (EC) No. 852/2004 on the Hygiene of Foodstuffs, (Chapter XII Annex II).

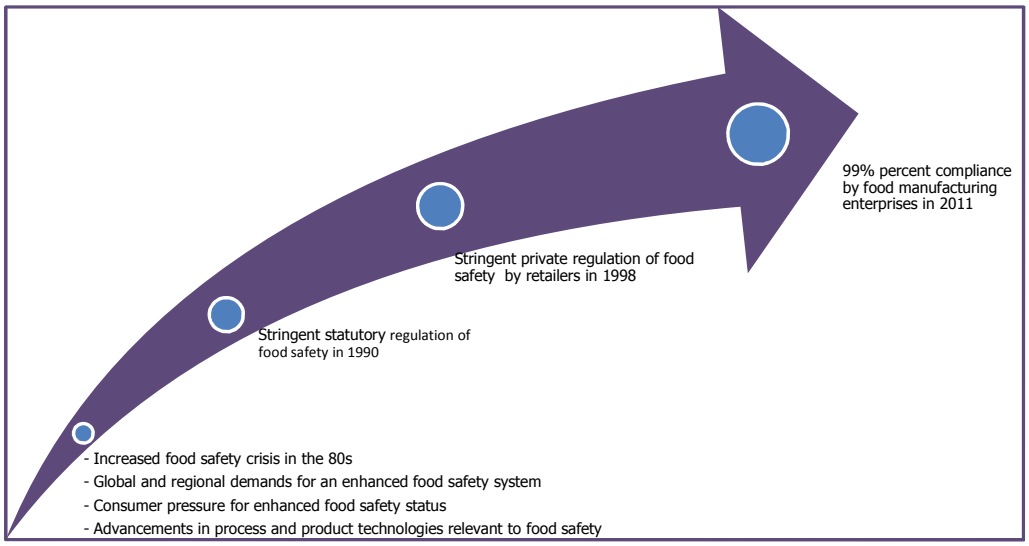


Figure 6-18: Progression of major events in the UK food safety system

The push for an integrated food safety management approach is primarily on the basis of the perceived degree of assurance it gives, towards the protection of public health and safety, and the increased transparency it introduces into food value chains.

Enterprises have responded to stringent regulations by both government and retailers, by complying with international food safety standards, through process-based, integrated food safety management approaches, and getting audited by third party institutions. See

Figure 6-18 for the key major events in the UK food safety system. The journey of compliance for the majority of enterprises has been characterised by a variety of challenges and capability gaps that enterprises needed to overcome. Some enterprises, particularly, SMEs could not on their own overcome the capability gaps. Even though government policy agenda is not focused on food safety, because of the perception that it is not a market failure, government funds have indirectly been used to facilitate the compliance of SMEs, and even larger enterprises through regional

initiatives, and the inherent design of qualifications for workers in the food and drinks sector.

According to the data collected, these efforts have yielded a remarkable 99% compliance level among food enterprises, and a knock-on effect on food safety. Interestingly, there are still some perceptions among some manufactures that the current state of food safety would still have been achieved without statutory regulation; and that enterprises out of their own volition would have complied with set requirements, even without compulsion. Furthermore, the system is too oriented towards the protection of consumers, without due assessment of the costs to industry. The perception gathered in the UK demonstrates that compliance with food safety requirements is a heavy burden and when given the option there exists the tendency for enterprises not to comply. As a result an element of compulsion is necessary to address food safety system failures. At the same time, the implementation of a technical regulation is not sufficient in itself to ensure compliance at the enterprise level, and therefore enterprises, particularly SMEs, require some kind of support to facilitate their compliance. Furthermore, it is realised that the requirements to effectively assure safe food in terms of, for example the physical infrastructure, financial and technical resources and administrative capacity, are so significant that neither government nor the private sector can provide all on its own (even in a developed nation context). Therefore there is the need for some sort of partnership between these two parties to facilitate the compliance of enterprises.

There are reputational effects that impact on decision-making concerning which enterprises qualify for orders in the global food manufacturing value chain. These are developed on the basis of the ability of enterprises to consistently manufacture safe food and the trust that is developed as a result. However, consistently producing safe food is not a sufficient reason to give enterprises access to the global food manufacturing value chain, as most enterprises are in business to make money. Therefore food manufacturing enterprises are expected to distinguish themselves on the global market, in terms of responding to other competitive indictors like price,

delivery, response time and reliability. These are the factors that determine final access.

The current food safety assurance system in the UK comprises several critical elements that highlight the fact that the basic minimum requirements for food safety recognised globally are currently operating effectively. Hence the scene is set for competitiveness of food manufacturers on the global market. Consequently, enterprises qualify for orders in the GFMVC.

CHAPTER 7: FOOD SAFETY ASSURANCE IN THE GHANAIAN FOOD MANUFACTURING SECTOR

This chapter investigates food safety assurance in the Ghanaian food manufacturing sector. A top-down approach is used to investigate food safety in the context of the current institutional, regulatory and policy frameworks, in terms of their capability to assure safe food and enhance access to the global food manufacturing value chain (GFMVC). The chapter draws on insights gathered from previous chapters to identify gaps in Ghana's food safety capability, and investigate the factors in the manufacturing environment influencing compliance with food safety at the enterprise level. The perceptions of relevant stakeholders regarding the potential role of a technical regulation, requiring enterprises to implement food safety management systems, based on Hazard Analysis and Critical Control Points (HACCP) was also explored, among other options to enhance the compliance of the sector with food safety requirements.

7.1 Approach

The overall strategy adopted was a case study. Within the national case, a case study method was used alongside document analysis to examine issues relevant to the food safety capability at the national and enterprise level, and how those two interact to affect the compliance of food manufacturing enterprises with both domestic and international food safety requirements, and by extension, food safety.

7.1.1 Document Selection and Analysis

The Ghanaian food safety assurance system is scarcely documented. It was, however, possible to get access to some documents which provided useful information about the sector, and some institutional arrangements that were relevant. The author believed that talking to current process owners alone may not have provided all the information required to understand the different elements involved in food safety assurance in Ghana. Furthermore, an effective analysis of regulatory texts was essential to understanding the food safety assurance system, and archived documents

hence provided a useful source of historical regulatory instruments. These were helpful in filling the gaps that respondents could not provide information for, in some cases, and also served as a means of triangulating some of the findings from respondents. Other archived records used were strategy documents, public sector reports, and reports prepared by private consultants, commissioned by either government departments or development cooperation partners.

The same strategy adopted for the UK to ensure the authenticity and credibility of documents used in this study was adopted for Ghana. The documents used were those published by institutions mandated by government to regulate food safety in Ghana, and publications by government departments and their agencies.

Contrary to practice in the UK, most of the documents were not published or readily available on the websites of regulators. The few that were already published, the researcher visited the Documentation and Information Centre (DIC) for regulators to select those relevant to answering the questions outlined on the semi structured interview scripts. For the documents that were not yet published, the researcher had to put in a formal request at the reception of regulatory institutions, to get authorisation from top-level managements for the release of such documents. The initial process of engaging top-level management was characterised by great difficulty as responses to requests were not forthcoming. The author had to do several follow-ups before access could be gained. The actual regulatory text ultimately reviewed was difficult to access initially because the DIC did not have copies. Furthermore, the regulatory texts were not published electronically, and hence eventually, a regulator gave out his copies to be duplicated for use in this study.

Because of the limited number of documents that were accessible to the researcher, all the key documents were included in this study.

Similar analytical techniques adopted for the UK were adopted here (see section 6.1.1), with the ultimate aim of summarising the message content to the elements of food safety capability pre defined, and complementing them with data collected from respondents so that predictions could be made about appropriate strategies to adopt to enhance the compliance of enterprises with food safety requirements.

7.1.2 Case Study

Within the Ghanaian context, a variety of institutions were deemed to be relevant to food safety assurance; however, the primary focus of cases to involve in the study was limited to food manufacturing enterprises, their suppliers, and regulators (public sector agencies and export advocacy groups) of the food manufacturing sector. Respondents from the retail industry and a third party auditor were included to get a relatively balanced view and cross-section of the sector and to allow for triangulating some of the findings from the main actors of interest.

A total of 18 respondents were selected from government and private sector agencies, providing various services to industry, relevant to food safety. Selection of some of the respondents was done using purposive sampling (Marshall & Rossman, 1999) and they suggested people they knew who could provide insights into food safety assurance in the Ghanaian food manufacturing sector (snowballing) (Marshall& Rossman, 1999). A subset of nine food manufacturing enterprises was selected from the sample used in determining the status of enterprises with food safety requirements in Ghana (section 5.1.2) for an in-depth case study investigation. This brought the total number of respondents to 27. Table 7-1 gives an overview of the respondents and a breakdown of respondents in each group.

Table 7-1: Respondents from case study institutions

Target group	No. of respondents
Food manufacturing enterprises	9
Third party auditor	1
Raw material suppliers	2
Regulatory agencies	12
Retailers/vendors	3
Total	**27**

The enterprises selected included subsidiaries of international enterprises, with both domestic and international certifications, domestic large and SMEs, some with both domestic and international food safety certifications, and others with only domestic certification who see no need for international certification, and enterprises formed as

a result of government and private sector partnerships (public-private enterprises), some with both domestic and international certification and others with just domestic certification.

These enterprises were selected because they were perceived to represent enterprises at different maturity stages in compliance with food safety regulation, and hence could potentially provide insightful information that will reflect the real status of the different categories of enterprises in Ghana.

7.1.2.1 Research Instruments

A semi-structured interview script was used for case study investigations. The same interview script (APPENDIX J) was used to investigate food manufacturing enterprises, suppliers and retailers. A different interview script (APPENDIX K) was used for regulators of the sectors; however, questions were adapted during interviews to ensure that the relevant stakeholders and process owners of particular processes and mechanisms of interest actually got to give information relevant to such processes.

7.1.2.1 Analysis

The data collected was qualitative in nature. A significant number of the interviews were recorded; others were in the form of handwritten notes and illustrations of respondents on sheets. The recorded interviews were first transcribed into case study notes (APPENDIX L) and synthesised with the field notes made by the researcher. Notes made from unrecorded interviews (usually using shorthand) were immediately typed out or handwritten into full notes after the interview. This was to ensure that the context in which the information was given was maintained, and the meaning of the shorthand language used in making notes were not forgotten by the author. These typewritten notes were processed significantly to reduce the text and make it clearer to the author. This action was guided by the purpose of the study and the underlying themes forming the foundations of the open-ended questions, which had been used to develop a descriptive framework (Yin, 2009). An overview of the analytical approach is seen in Figure 7-1.

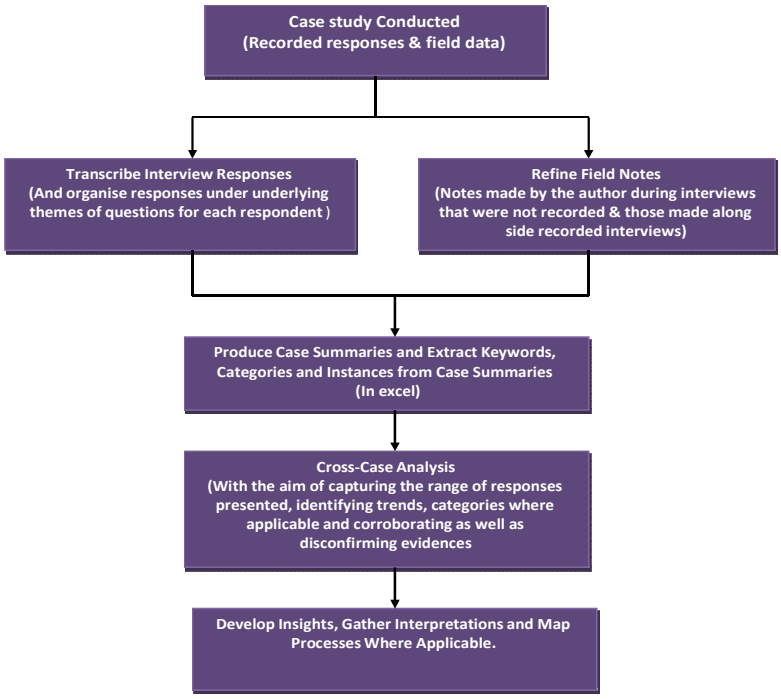


Figure 7-1: Analytical approach to responses from cases

To maintain the anonymity promised respondents, codes were assigned to each respondent to ensure that when a direct reference was made to a perspective expressed by a particular individual, their identity was not known. The elements of the descriptive framework were outlined in Microsoft Excel, against the different respondents.

Case summaries were developed against each element of the descriptive framework and keywords, categories and instances documented in Excel (APPENDIX M) against the different respondents. A cross-case analysis was conducted with the aid of the excel sheets, referring to case summaries for descriptive backgrounds and context when needed. This facilitated identifying trends, categories, both corroborating incidences, and disconfirming ones. The findings from within cases were aggregated (without the intent to express them in statistical formats), where possible (Stake, 1995). The questions that span all stakeholder groups (e.g. Q2 and Q3 for food manufacturers), were used to complement each other, while ensuring that the different stakeholder group perspectives were not lost in the analysis.

The outputs of these processes were factors, insights, and processes that facilitated the understanding of the case.

7.2 Strategic Response to Food Safety

The dominant strategic response of Ghana to food safety can be described as 'reactive loyalty' (Figure 7-2). This means that the mechanisms, elements and controls in place to assure safe food, reforms and upgrades are primarily in response to international and market demands.

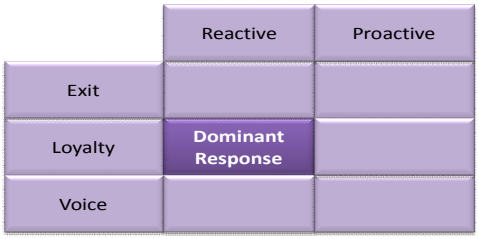


Figure 7-2: Key national strategic response to food safety in Ghana

To some degree, 'voice' is also employed through participation in technical committees (TCs), responsible for negotiations and decision making, relevant to food safety agreements and international standards development.

Ghana is a member of the Codex Alimentarius Commission (CAC), the World Trade Organisation (WTO) and the International Standards Organisational (ISO). Even though the country is a full member of ISO, it is involved in 27[31] out of the 217 technical committees. It participates fully in nine technical committees, which includes the food products technical committee, and has observer status for 18 others. As a participant in Technical Committees (TCs), the country is supposed to take part in the standards development process; this presents opportunities to contribute and influence the standards development process, and hence, exhibit proactive voice. It is, however, unclear as to the extent and value of contributions the country makes through this level of involvement in food safety diplomacy. It is not explicit whether Ghana adopts an exit strategy at the national level; what is apparent is the commitment of more resources and attention of regulators to specific sub-sectors (e.g. the fish and fishery

[31] This number was computed from the list of ISO technical committee list in March 2010

products, and cocoa sub-sectors) in the food sector. And this partly reflects a selective response to food safety, which could be viewed as 'exit' strategy at the national level.

7.3 Evolution of Statutory Food Safety Regulation in Ghana

The regulations governing food safety in Ghana have not changed a lot over many years (Figure 7-3). Available records on statutory food law and regulations in Ghana suggest that the national standards body, the Ghana Standards Board (GSB) was established by the Standards Decree, 1967 (NLCD 199), for the purposes of standardisation[32], with a scope that includes food.

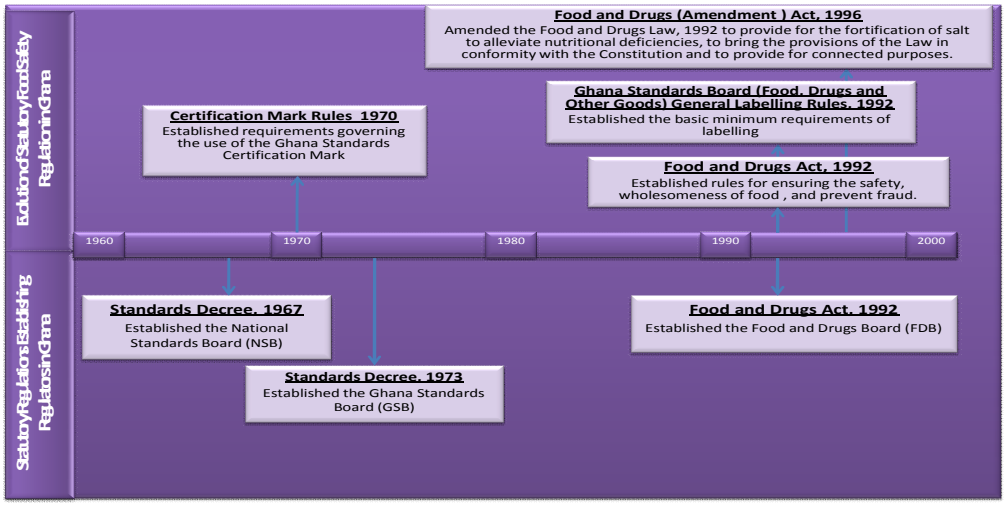


Figure 7-3: Food safety regulations in Ghanaian manufacturing sector

This Decree was superseded by the Standards Decree, 1973 (NRCD 173). According to NRCD 173, the GSB was given the mandate by NLCD 199 to make rules to govern industry.

Through this mandate, the Board, hence made the Ghana Standards (Certification Mark Rules) (LI 662) in 1970 to control industry (including the food industry).

Twenty two years after the introduction of LI 662, the Food and Drugs Act, 1992 (PNDCL 305B) was introduced to establish the Food and Drugs Board and make provisions to ensure the safety and wholesomeness of food, and prevent fraud. PNDCL 305B was amended in 1996; however, the amendments were not relevant to food safety.

[32] This document was not available to ascertain the functions assigned to the Board.

In the same year that the Food and Drugs Act, 1992 was introduced, the Ghana Standards Board (Food, Drugs and Other Goods) General Labelling Rules, 1992 was introduced. This regulation does not specify requirements for food safety, however the requirements introduced by the regulation ensures that some specific information is put on the product, which allows for some level of traceability of food products; and this has a direct link with product withdrawals and identification of the sources of food contamination, in the event that a food safety crisis occurs. There is also currently a draft Food and Drugs Regulation, 2000, proposed by the FDB, which is yet to be passed by Parliament (Sefah-Dedeh et al, 2009).

7.4 Private Regulation of Food Safety

Data collected in this study shows that there are currently no private or domestic food safety standards developed for the Ghanaian food manufacturing sector. However, enterprises with export-oriented supply chains reportedly have been motivated by their customers abroad to adopt globally accepted private international standards, in addition to retailer standards, to ensure continuing trade relations in the GFMVC. From the survey results in Chapter 5, it can be deduced that compliance with some of these international standards have been realised amongst some international enterprises serving the domestic market, even though it is not a requirement, because according to them it is deemed good practice, an appropriate way of demonstrating compliance with food safety requirements, using certifications issued as a result, and as a marketing tool.

7.5 Food Safety Capability in Ghana

Given the overall strategic choice and selective approach adopted by Ghana to food safety, some export-oriented sectors have been given close attention. Considerable efforts are also invested by government regulators into ensuring that export approval received from external trading partners remain valid for the selected sectors, and continue to guarantee the country access to some international value chains. Particularly, the cocoa, and fish and fishery products sectors, according to regulators,

have a relatively structured approach and well laid down protocols governing it. The government is significantly involved in the cocoa value chain, from research, raw material production, processing, marketing, sales and quality assurance. The intent of government adopting this approach is to ensure that raw commodities and processed intermediaries are produced to the standards set by international markets. This is primarily because Ghana has a comparative advantage in the production of cocoa and a significant amount of the country's revenue depends on cocoa export earnings. Respondents also indicated that government agencies are significantly involved in the fish and fishery products sector. These agencies are strictly enforcing the standards adopted by Ghana, and the requirements set by trading parties, particularly in Europe. The general perception and the belief of regulators is that the commitment and involvement of government is what has given the international community confidence in the capability of Ghana to produce consistently safe products in those particular sectors.

On the basis of data collected in this study and available evidence from literature (Sefa-Dedeh, 2005), the same cannot be said for other product ranges in the food manufacturing sector. Even though official documentation (legal texts) suggests there are some national structures in place for food safety assurance, most food manufacturers are left to their own devices. However, a significant percentage of them are not in a position to deliver food products to the standards required by the international market, or even by the domestic market. Consequently, the prospects of access remain uncertain.

7.5.1 Relevant Stakeholders

Similar key stakeholders involved in the UK food and drinks sector are involved in the Ghanaian food manufacturing sector (Figure 7-4).

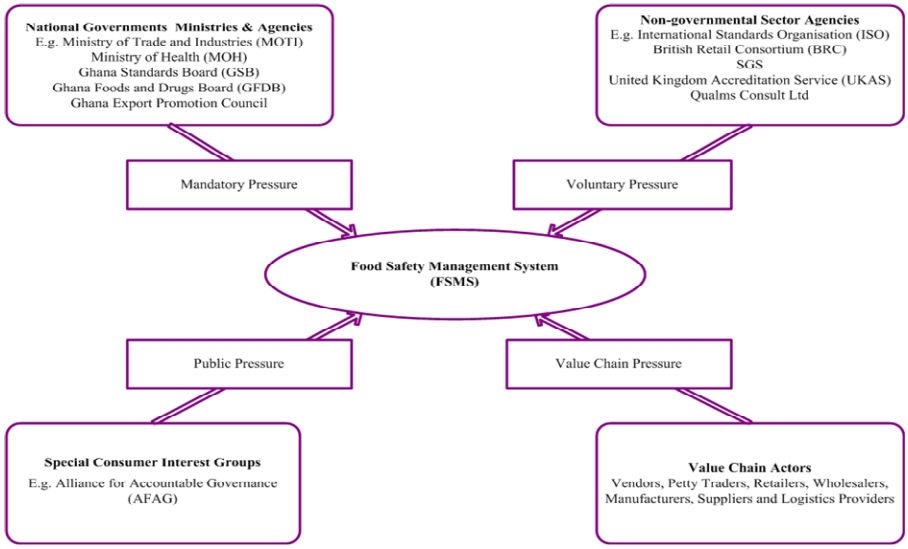


Figure 7-4: Key stakeholders in food safety management in Ghana

These stakeholders include:

Government agencies and ministries, e.g. the Ministry of Health (MOH) and its agency, the Food and Drugs Board (FDB), the Ministry of Trade and Industry (MOTI) and its agency, the Ghana Standards Board (GSB), are involved in the development of food safety statutory regulations and policy in Ghana. These ministries and their agencies have the mandate to determine how food safety is assured in the Ghanaian food manufacturing value chain.

There are a number of **non-governmental agencies,** which either participate directly or indirectly in food safety assurance in Ghana. A limited number of domestic agencies are involved, with international agencies (UKAS, BRC, SGS) dominating this group. The industry for the provision of food safety support services (e.g. accreditation for third party institutions, training internal auditors and verification and validation of food safety management systems (FSMS)) is dominated by a few international institutions. Some of these institutions (e.g. the BRC) develop private standards which also apply in Ghana, for enterprises that desire to trade internationally (*de facto* mandatory), and others (e.g. SGS) act as auditors for international customers, who are unable to travel into domestic contexts to verify the processes used to produce the food product. There are also domestic sector associations (e.g. the Federation of Association of Ghanaian Exporters, FAGE) which are also involved in providing guidelines and

information on export requirements to their members, and others (e.g. Qualms Consultancy Services) who actually develop the full FSMS, document it, and get involved in the implementation on the shop floor.

Special consumer interest groups involved in food safety assurance in Ghana are ad hoc; they are formed for specific purposes and disband afterwards. This does not allow due consideration of consumer issues over time, to get an understanding of the issues of true concern to consumers, and what scopes of action are open to addressing such concerns effectively.

The roles **of value chain actors** in Ghana are similar to those in the UK. They receive pressure from all other relevant stakeholders and are expected to ensure consumer safety.

7.5.2 Food Laws and Regulations

Current statutory laws and regulations governing food safety address different functional nodes within the domestic value chain. Those relevant to food manufacturing are discussed in this section. The two primary statutory regulations governing food safety in the Ghanaian manufacturing sector are:

- The Food and Drugs Act, 1992 (PNDCL 305B);
- Food and Drugs (Amendment) Act, 1996 (Act 523).

The part of the PNDCL 305B (1992) and its amendments, Act 523 (1996), which focuses on food (part 1) contains provisions that prohibit the sale of unwholesome, poisonous and adulterated food (section 1), and prescribes standards for food. The legislation also prohibits behaviours by any persons, with regards to labelling, packaging, selling or advertising any food in a manner that is false, misleading or deceptive, as regards its character, nature, value, substance, quality, composition, merit or safety (section 3). Also, passing food which does not comply with prescribed standards as though it did is an offence (section 4). There is also a provision that makes selling to the prejudice of a purchaser any food which is not of the nature, substance or quality of the article demanded by the purchaser an offence (section 5).

The provisions outlined above emphasise the act of selling. This means that the seller (including manufacturers) must be in a position to ascertain the status of the food manufactured or purchased, with the intention to sell, at the point of purchase, or implement processes to ensure that either the manufactured food or food for retail is safe. This is however not the case in practice. The evidence collected in this study demonstrates that a considerable number of indigenous food manufacturers have not implemented adequate integrated proactive processes to ensure safe food, and are also not in a position to ascertain adequately the status of food before selling, because of the lack of adequate food safety capability. As retailers/vendors source products with a presumption of safety and often, quantities are relatively smaller, they are not in a position to demand that manufacturers implement particular measures relevant to food safety. Neither are retailers capable of implementing processes that facilitate ascertaining the status of the food they purchase. Manufacturers are explicitly brought into the scope of the regulation in section 6. The section requires that manufacturing is done under the supervision of a person with appropriate knowledge and qualification who can ensure the purity and wholesomeness of the food; however, what is appropriate knowledge and qualification is not explicitly stated. Neither are any qualifications, competency tests or occupational standards established, to give meaning to the requirement. The requirement in section 6 is important, as well as relevant to food safety assurance, because in-depth technical knowledge and experience of the product and of the processes used to deliver the product is required to understand what constitutes risks to the consumer.

Producing food under unsanitary conditions (in other words unhygienic conditions) is also considered an offence (section 7). The section (sub-section 2) also requires that food be stored and conveyed in a manner that preserves its composition, quality and purity, as well as minimises the dissipation of nutritive properties from climatic and other deteriorating conditions. Anybody that contravenes any of these requirements commits an offence. The requirements in section 7, do not prescribe a framework or guiding standards, to suggest to chain actors what constitutes unhygienic conditions in

the context of manufacturing, or what levels are acceptable according to statutory regulations.

The defence under these regulations is in section 8 (sub-section 3): which states that:

(1) Where a person is charged with an offence under paragraph (b) of sub-section (1) or under sub-section (2), it is a defence for him to prove:

a. that he gave notice to the person to whom he sold, deposited or consigned the food in question that it was not intended for human consumption; or
b. that, at the time when he delivered or despatched it to that person, either it was fit for human consumption or he did not know, and could not with reasonable diligence have ascertained that the food was unfit for human consumption.

Ideally, the defence under sub-section 3 (paragraph b) should drive food manufacturers to implement effective processes to ensure food safety, so that in the event that an offence is committed under the provisions of this Law, they can demonstrate that they have exercised reasonable diligence to prevent committing an offence. However, evidence collected in this study (see Chapter 5) suggests that food manufacturing enterprises are not exercising due diligence. Furthermore, the term 'due diligence' in the context of manufacturing is quite elusive, and does not give suggestions as to what procedures might be appropriate or even adequate for due diligence purposes, in the context of Ghana.

The scope of control of the regulation to some degree covers the manufacture, import (section 40), export, distribution, use and advertisement of food. Theoretically (ITC/GSB, 2009) and on the basis of insight gathered from government regulators, the PNDCL 305B, as amended is the only technical regulation (and hence compliance is mandatory) governing food safety in the manufacturing value chain, however, the legislation does not provide a comprehensive framework to assure safe food. Essential components for, food safety assurance (FAO/WHO, 2003) and the protection of consumer health and safety are missing. Particularly, no primary duty of care is placed on any specific actors for food safety, and no provisions have been made regarding traceability, through the chain and product recalls. Also, labelling is not adequately

catered for. Consequently, when the food safety system fails, adequate information will not be available to identify the sources of the food hazard, and it may be necessary to withdraw the product, to mitigate the scale of adverse impact on consumers, and the costs related to the provision of health care services. The lack of traceability, which extends into the retail value chain means that effective emergency procedures cannot be implemented to withdraw hazardous food products that have already made it onto the market. In terms of accessing the GFMVC, lack of traceability is considered a huge gap in capability. Registration/licensing of premises and registration of food products are not accounted for by current regulations; and enterprises are under no obligation to update regulators with information on the changes that occur in the operations of the enterprise. What this means is that adequate information is not being collected on the enterprise, and hence risk profiling, which will facilitate a targeted approach to the enforcement of regulations, and therefore effective use of resources available is not being applied. Furthermore, the regulation does not make reference to internationally accepted codes of good practices, e.g. the Codex Alimentarius Commissions', HACCP principles or any other best practices.

In section 47, of the PNDCL 305B, there is a provision which mandates the Minister of Health to make regulations, after consultation with the Board for a variety of purposes. These purposes include among other things, prescribing methods of manufacture, processing, storage and transportation of food. Available legal texts, however, suggests no such statutory regulations relevant to food manufacturing have been introduced. Despite this, there are other regulations governing manufactured food that reportedly operate in the context of standards. These are:

- The Ghana Standards (Certification Mark) Rules, 1970 (LI 662) and ;
- The Ghana Standards (Certification Mark) (Amendment) Rules, 1970 (LI 664);
- Ghana Standards Board (Food, Drugs and other goods) General Labelling Rules, 1992 (LI 154);

The Ghana Standards (Certification Mark) Rules, was made in 1970, as a result of the powers conferred on the National Standards Board[32], by paragraph 5 of the Standards

Decree, 1967 (N.L.C.D 199)[33]. The Rules, as described in LI 662, as amended, prohibits the sale of, distribution of, preparation for export, and export or otherwise disposal of goods manufactured by an industrial process in Ghana, unless a valid licence to use the Ghana Standards Certification Mark is acquired. Furthermore, the product must bear a facsimile of that standard mark, labelled accordingly as ''Made in Ghana' and bears code numbers indicating the batches of production to which the products belong. The licences for using the certification mark (see Figure 7-5) are issued after inspection of the premises, where the goods are manufactured or stored.

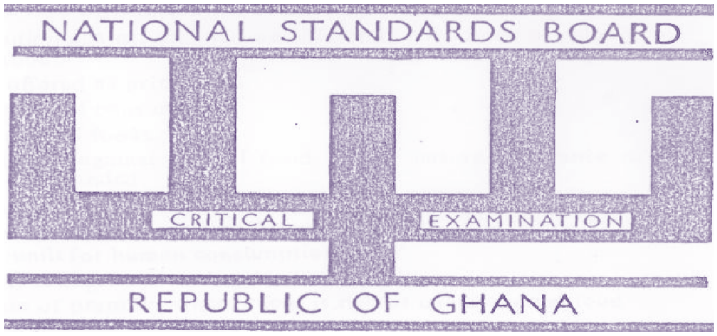


Figure 7-5: Ghana Standards Certification Mark

An examination and samples of the goods manufactured or stored must also be tested to ascertain that they conform to established standards (under the Standards Decree, 1973). In the case of a renewal, the products must continue to conform to the standards referred to by the Law (section 4). If these regulations are contravened, an offence is committed, and the offender is liable to prosecution.

A convicted offender would have to pay a fine or imprisonment, in the event that the fine cannot be paid. Provisions have been made in the Rules, which allows the Board to either cancel or revoke the licences for which requirements are breached at any point in time, within the validity period of the licence.

While the LI 662 incorporates some labelling requirements, the Ghana Standards Board (Foods, Drugs and other goods) (General Labelling) Rules, 1992 (LI 1541) is dedicated to laying out the basic minimum information requirement to be put on the product labelling. This information is expected to include the name of the food, a list of

[33] This Board and Law are not elaborated in this thesis because information is not available to discuss the Board, and the Law was replaced by the Standards decree, 1973.

ingredients, an indication of the batch to which the product belongs and information indicating the storage conditions and status of the food. The information requirements, as regards traceability, here again are based on putting a batch code on the final product label. There is no provision to ensure that a final product is fully traceable within the manufacturing process.

The scope of statutory regulation in Ghana covers,

- information measures (even though minimal), but, the information provided by manufacturers on the product is inadequate to facilitate consumer decision making;
- prior approval for particular products;
- and food safety standards.

The regulations governing manufactured food are designed predominantly on performance standards. There are no target standards (Consumer Protection Laws). On the basis of theoretical definitions of a technical regulation, there are also no performance standards mandated by law, currently in operation. There are limitations to each of these mechanisms; in that, most of them, with the exception of process standards, do not provide a mode of proactively controlling food safety hazards. However, process standards on their own do not also provide a comprehensive approach to food safety assurance, as they rely on performance standards for hazard verification and validation.

7.5.3 Organisational Arrangements

A number of government institutions are involved in food safety assurance in the food manufacturing sector.

The Food and Drugs Board (FDB) was established in 1992, by the PNDCL 305B (section 27), and given the mandate to regulate, within the confines of the law that established it, manufactured food in Ghana. The FDB operates under the supervision of the Ministry of Health. See Figure 7-6 for an overview of organisational arrangement for food safety in Ghanaian manufacturing sector.

The functions of the Board (section 28) include, but are not limited to:

1. Advising the Minister responsible for Health on measures for the protection of the health of consumers;
2. Monitoring through the District Assemblies and other agencies of State, compliance with the Law;
3. Advising the Minister responsible for Health on the preparation of effective regulation for the full implementation of the provisions of the Law;
4. In co-operation with the Ghana Standards Board, the Agency is supposed to ensure adequate and effective standards for food.

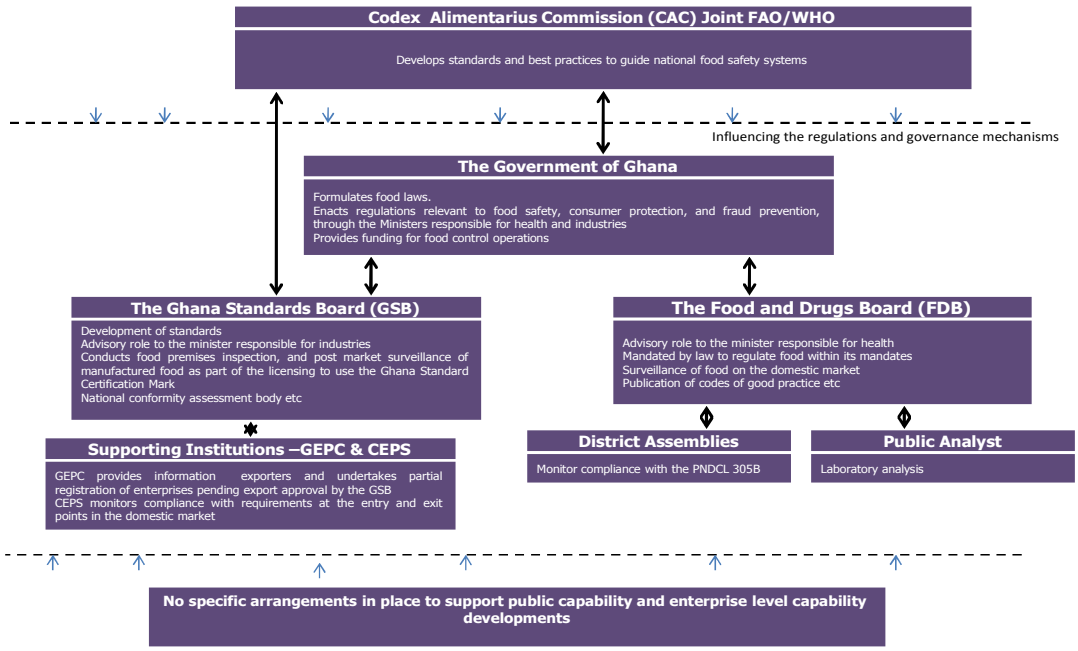


Figure 7-6: Overview of organisational arrangements and relationships

From the description of functions assigned to the Board (particularly point 2 and 4 above), and the general provisions outlined in the statutory instrument (section 36 of PNDCL 305B), it is implied that the Board has been given risk management responsibilities relevant to food safety. This mandate is exercised through food premises inspection, post market surveillance, verification and validation of manufactured food products against set standards, among other things.

The responsibility for food safety risk management in the manufacturing value chain in Ghana is shared with the Ghana Standards Board (GSB)[34], as is reflected in the requirement to cooperate with the Ghana Standards Board (point 4, under functions).
In practice, however, some requirements have been set by the FDB, which have not been explicitly accounted for in the provisions that regulate food or in the provisions that define their roles and responsibilities. In particular, making it mandatory for food manufacturers to register their products with the FDB and having manufacturing sites checked and approved (licensing) before being used to manufacture products. Even though no provision is made for the registration of food in the part of the PNDCL 305B on food (part I), there is a requirement for the Board to keep separate registers for food, and the other articles relevant to this regulation (section 25).
Also, risk assessments and relevant key activities to assuring safe food (and to risk management), through the whole manufacturing value chain, which also includes catering for issues around consumer awareness creation and training for industry, are not explicitly catered for in the description of mandate.

According to the regulatory text, the scope of functions of the FDB covers the domestic market and seems to include imports (sections 36 & 40) and exports. Reflecting on section 36, it suggests that once an article to which this law applies is at a premises in the domestic market, an authorised officer has the mandate to exercise his regulatory functions. And this means that imported manufactured food and food products ready for export also fall under the jurisdiction of the FDB. Explicit importing and exporting procedures are, however, not accounted for in the regulation.

The Ghana Standards Board (GSB) was formed by the Standards Decree (NRCD 173) 1973, (superseding the Standards Decree, 1967) and amended by the Standards (Amendment) Decree, 1979, also known as AFRCD 44. This Decree was enacted several years before the establishment of the FDB. The GSB operates under the Ministry of Trade and Industries.

The functions of the Board according to the Decree include:

[34] Ghana Standards Board will be discussed in later sections.

1. To prepare, frame, modify, or amend specifications and promulgate standard specifications;
2. To promote research in relation to specifications; and to provide for the examination and testing of goods, commodities, processes, and practices, and for those purposes the Board may establish such laboratories and other facilities as it thinks fit;
3. To co-operate with representatives of any industry, or with any government department, local authority, or other public bodies or persons with a view to securing the adoption of standards;
4. To provide for the registration and regulation of the use of the standard marks;
5. To maintain the necessary machinery to ensure that goods prepared and manufactured for export are distinctly marketed for export only, and to provide for the issue of a certificate to the effect that goods comply with the known requirement of standards in the country to which they are or about to be consigned, before the export of such goods is permitted;
6. To institute training schemes for its staff either in Ghana or elsewhere in furtherance of its aims;

The GSB is supposed to operate within a risk analysis framework, because the scope of mandate and functions account for these elements (section 3, subsection 2). The Board has the mandate to formulate standards and specifications, to inspect processing and manufacturing facilities (as part of the process to award the license to use the certification mark and ensure that requirements are continually being adhered to during the validity period of the license), training of industry, product certification, facilitation of system certification[35] and provision of information to chain actors, on both local and international standards[36].

The Standards Decree, 1973 also mandates the GSB (in consultation with appropriate committees) to declare any specifications, including international or other overseas specification, to be a standard specification, for the purposes of this Decree. In a like

[35] As of November 2009, when the author investigated regulators, it was indicated that GSB has not got the competence to certify integrated food safety management systems. The Board now undertakes system certification of ISO 9000 series.

[36] These functions are executed across all industries – including the food manufacturing sector.

manner, the Board may amend or revoke any such declaration (section 11). Based on this mandate, a significant number of standard specifications have reportedly been developed, and in some circumstances, some international standards have been adopted. For example, the ISO 22000 international food safety standard for food manufacturers has been adopted by Ghana (GSB, 2009). However, no statutory regulations have been enacted to mandate compliance with both the developed domestic standards and the international ones, which have been adopted. Reference is made in section 4 of the PNDCL 305B, to standards, which states that 'where a standard has been prescribed under any enactment for any food, any person who manufactures, labels, packages, sells or advertises any food in such a manner that it is likely to be mistaken for food of the prescribed standard commits an offence'. This does not in any way require food manufacturing enterprises to comply with the standard specifications developed by the Board, for as long as food products are not presented as complying with those standards. The only regulation that requires enterprises to comply with standards developed by regulators is LI 662, as amended, which requires that before a license to use the Ghana Standards Certification Mark, samples must be examined to ascertain their conformity with prescribed standards under the Standards Decree. LI 662 seems to suggest that compliance with this requirement is mandatory, and if enforcement is achieved in practice, then standard specifications would guide food manufacturing operations. As per the provisions contained in these rules, every product on the Ghanaian market, manufactured in Ghana is expected to comply. Regulators indicated that previously, controls implemented to ensure food safety, on the basis of LI 662, were being made mandatory; however, because the rules use the standards framework, theoretically, they cannot be made binding on the enterprise as per the ITC definition of standards (ITC/GSB, 2009). Regulators highlight that reforms are currently underway to seek to address this anomaly, and ensure that international good practice is adhered to; however, a slow approach of remedy is being adopted.

Official legal instruments suggest that exports and imports are also under the jurisdiction of GSB. Export procedures for the purposes of food safety have also been

implemented by the GSB (mandate derived from point 5, above). Generally, the GSB has four aims (section 2 of the Standards Decree, 1973), and has been given the mandate to perform such functions and exercise such powers as in its opinion are necessary to further most effectively the aims of the board; this gives the Board a wider scope of operation, without boundaries, which could extend into the jurisdiction of the Food and Drugs Board and create overlaps in the food system.

In addition to these two key institutions, there are a number of other public institutions (e.g. the Ghana Export Promotion Council (GEPC) and the Customs Excise and Preventive Service (CEPS)) that provide support at different stages in the export value chain. According to regulators, all prospective exporters of manufactured food are required to register with the GEPC at some point, as part of the export procedures for food safety purposes, before approval by the GSB, so that they can receive guidelines on relevant products. It was reported by regulators that CEPS officers are responsible for undertaking the final checks (includes inspecting certificates issued by the GSB, demonstrating export approval) before export of the food products.

A provision has also been made in the PNDCL 305B, as amended, which allows the Minister responsible for Health to appoint a public analyst[37] for every District, capable of undertaking such analysis as may be required by this Law, under terms as he may determine (section 38, sub-section 1).

The organisational arrangement for food safety assurance in Ghana fits the model of a multiple agency system. From the above description of functions, it is realised that different government institutions are involved at different levels within the food system (national and local), and involved in different functions. From available institutional frameworks and practice, it is both stated and implied that risk assessment in the manufacturing value chain is the responsibility of both the GSB and the FDB, because they have both been assigned the responsibility for food policy development, and this cannot be undertaken effectively without adequate risk assessments. These two institutions are also assigned risk management

[37] A public analyst is defined as a person appointed by the Minister responsible for Health to act as an analyst for the purposes of the PNDCL 305B.

responsibilities, and even though not clearly indicated, risk communication is also undertaken by the institutions, as part of their mandates to ensure consumer safety. International best practice suggests that risk assessments should be separated from risk management to ensure objective consumer protection measures, with a resultant confidence among domestic consumers and credibility with international buyers (FAO/WHO, 2003). However, the current organisational arrangement falls short of this best practice and reflects a lack of transparency.

7.5.4 Mechanisms for Coordination and Cooperation

LI 662, its amendment, 664, and LI 154 are supposed to be monitored and enforced by the Ghana Standards Board (section 3, paragraph f). It is apparent that the responsibility for official control activities (inspection, monitoring and surveillance etc) are executed by the two key institutions discussed above (even though supported by other institutions) as the scope of operation of the GSB extends across all industries and sectors, including the food manufacturing sector.

Table 7-2: Operational overlaps of regulators in practice

Operational Controls	Agency
Licensing of premises/ inspection of premises	FDB[38]/GSB
Post-market surveillance	GSB/FDB
Consumer awareness creation	GSB/FDB
Product certification	GSB[39]
Product registration	FDB
Independent certification services	GSB
System certification	GSB
Technical information and advice to enterprises	GSB[40]
Training of industry	GSB/FDB

Regardless of this, evidence gathered in this study (particularly from legal text and practice) suggests that the boundaries of control bodies and their jurisdictions are not clearly delineated, and a system of procedures do not exist for the coherent coordination and cooperation among regulators. Consequently, an overlap of

[38] GSB does an assessment of premises as part of it product certification scheme.
[39] Product registration and certification both involve sampling and laboratory testing of food products.
[40] The FDB is not included here because enterprises suggested that they did not receive advice and technical information from the regulator.

institutional roles and responsibilities occurs among regulators, which are mandated by enacted regulations (Table 7-2).

7.5.5 Operational Mechanisms

Provisions relevant to co-operation have been made in the regulations that formed the GSB (section 3, subsection 2, paragraph k) and the FDB (section 28, paragraph b). The GSB is to co-operate with industry or government departments, local authorities, or other public bodies or persons, with a view to securing the adoption of standards. The FDB is also to cooperate with the GSB to ensure adequate and effective standards for food, in the latter.

The details of mechanisms for cooperation or guiding frameworks are not clearly established either in regulations or codes of good practice. The organisational arrangement depicts interactions between regulators and institutions e.g. CEPS, however, no operational mechanisms have been established to govern the nature of the relationships amongst institutions involved in food safety assurance. On the basis of the data collected, one can say that because of this lack of effective coordination and cooperation some food products successfully leave the shores of Ghana without having gone through food control authorities. According to regulators, when these products are consistently found to be a risk to consumer health and safety at importing country's borders, they put Ghana on the list of countries for which procedures should be tightened, and a risk of losing access to GVCs also exists.

The regulation that provides the FDB with its mandate provides some lines of authority (section 32 & 33 of PNDCL 305B). However, detailed operating procedures, to guide authorised officers, and give the regulator oversight of the activities of district assemblies are not provided for. According to regulators, each authorised officer follows the requirements established in the standard they are to work with. Available evidence suggests that interpretations of these standards can vary even among regulators. Furthermore, the details of the specifications used for qualifying analysts are not explicitly stated or published.

The provision for public analysts in section 38 (sub-section 1) lays emphasis on a person capable of analysis; the effectiveness of the analysis of a sample goes beyond the person conducting the analysis. The quality of the results and universal acceptance depends as much on the reputation of the institution conducting the analysis, the infrastructure used for analysis, on whether the laboratory used for analysis is accredited or not, and on the method used for analysis. Accordingly, transparency and consistency in the control activities of both the Board and the public analysts, which could potentially foster trust and confidence in the food safety system in place among chain actors, particularly consumers is not being pursued. However, public analyst play a significant role in the proceedings under this Law (section 44, paragraph a).

7.5.6 Operational Delivery Performance

The GSB is required to submit annual reports to the minister responsible for industries, with regards to its activities during a particular year (section 18 of the Standards Decree, 1973). This section also requires financial accountability through certification by the auditor-general or anybody authorised by the auditor-general, however, none of these have a direct bearing on how effectiveness is being measured or managed in the operations of food safety. No such requirement was found for the FDB. No clear operational delivery performance mechanisms (e.g. audit and review) or indicators have been outlined to manage the operational performance of public analyst and district assemblies. Consequently transparency and consistency in the control activities of both the board and the public analyst, and trust and confidence in the food safety system in place among chain actors is not being fostered.

The data collected indicates no mechanisms are established for ensuring transparency and accountability of control officers. The lack of clear, documented and published operational mechanisms means that there is no requirement to measure the operational delivery performance of food authorities or even to hold control officers accountable.

7.5.7 Values

Statutory regulations are silent on the principles and strategy expected to guide regulations and regulatory activity. Regulators highlighted that the national food safety system in Ghana has no overarching national food safety policy and strategy, to demonstrate clearly to relevant stakeholders the country's position on, and commitment to food safety. As a result, there are no guiding principles for frameworks in operation and the activities of the different regulatory institutions that operate in the sector. This makes it difficult to, ensure coherence of the food laws and regulations in operation, and maximise the use of scarce resources. A group of consultants commissioned by the government of Ghana (GoG) and some international development cooperation partners are however, currently undertaking a situational analysis, towards the development of a national food safety policy.

Some respondents indicated that because of pressures on the health system, which is worsened by the recent implementation of the National Health Insurance Scheme (NHIS), and the lack of structures for collecting information, no adequate effort is made to collect and organise the data, which when analysed could potentially provide insight into effective regulations and control strategies relevant to food safety. Consequently, risk analysis (particularly risk assessments) is patchy.

There is some degree of financial transparency in the operations of regulators, in that the costs and fees for control services provided to industry are published, and some level of transparency and accountability is also realised between regulators and their relevant ministries, (see section 18 of the Standards Decree, 1973). However adequate transparency in regulatory operations and information cannot be claimed. There is a lack of transparency between the district assemblies and the FDB, and FDB and the GSB, even though there is a clear provision for cooperation to provide effective standards for food. The requirements regarding transparency between the FDB and public analysts is clearly defined, however the status of the relationship with regards to transparency between the FDB and District Assemblies could not be verified.

7.5.8 Resources

Over the years, it has been reported that international development cooperation partners (e.g. UNIDO) have played a significant role in providing support for the development of Ghana's capability to export consistently safe food products. Food safety regulators in Ghana however, work under specific government departments. According to regulators, they are government institutions and hence derive a greater percentage of their resources from government. The following section discusses resources available to regulators with regards to food safety assurance.

7.5.8.1 Human Resources

As of 2008, the Ghana standards Board had 179 technical staff; the Food and Drugs board also had 80 technical staff (Government of Ghana/World Bank, n.d.). These regulators have the mandate to recruit such persons (e.g. consultants, members of the technical and administrative workforce) as they deem necessary, in the pursuance of their aims and functions (section 4 and 7 (sub-section 2 of the Standards Decree, 1973; section 34 of the Food and Drugs (Amendment) Act, 1996)). This suggests some degree of autonomy with regards to recruitment, however, there is also scope for political meddling, and influence as the members of the Board (the governing bodies of regulators) for both regulators are appointed by the president, and there is also scope for political influences in the selection of other employees of regulators (section 32, sub-section 2).

Regulations have not prescribed any specific competency requirements or qualifications for authorised officers or the workforce of the two key agencies. It was discovered, however, that there is a minimum qualification for employment for specific positions. For example, the minimum qualification for employment as a standards officer is a good first degree in relevant disciplines – sciences, biochemistry, engineering etc. The GSB is allowed to institute training schemes for its staff either in Ghana or elsewhere, in the furtherance of its aims (section 3, sub-section 2, paragraph r of the Standards Decree, 1973). No such provisions have been made in regulations

for the FDB. Certain key personnel of regulators may also attend conferences or meeting relevant to global international institutions involved in food safety.

On a more general level, one regulator indicated that the issue of competence and competence certification is a huge gap in the Ghanaian food manufacturing sector, as there are no standards for demonstrating competence, or set qualifications in relation to food safety professionals. The main route to acquiring knowledge of food and food safety competences is through the conventional university routes. The respondent perceived that specialised training is required for specific aspects of food control management and this is a challenge for the food safety assurance system.

7.5.8.2 Financial Resources

Food safety regulators in Ghana reportedly have yearly budgets for the consideration of government and for the provision of funding for food control activities. These budgets are often fully funded by government. According to regulators, there is a special fund into which the revenue generated by regulators as a result of the services provided to industry must be deposited. These funds are relied upon to supplement government funding for the budgets of regulators, in the event that regulators require more funds to enable them to execute their functions. Access to funds would, however, have to be requested though government. Data on budgetary allocations were not publicly available to investigate the priorities for allocated government resources. Regulators highlighted that even though currently government funds the Board, they are being encouraged to be self-financing.

Development cooperation partners (e.g. UNIDO) also provide funding for a series of capability development activities both at the national and enterprise level. Available reports (Sefa-Dedeh et al, 2009) suggest that funds have been provided for the accreditation of some laboratories used by some regulators. According to regulators some enterprises have also benefited from initiatives to facilitate capability development for the implementation of quality and food safety management systems (ISO 9000 & ISO 22000) and get internationally recognised certifications.

Data collected for this study suggests that there are a number of financial facilities that are specifically designed for the export community, institutions providing support services to the export community, and all enterprises (including SMEs) may have access to these funds, if they meet eligibility[41] requirements. Among these are the Export Development and Investment Fund (EDIF), Export Development and Promotion Facility Account (EDPFA).

7.5.8.3 Information Resources and Communications Infrastructure

Access to information on SPS standards and compliance requirements in major export markets (e.g. EU and America) are publicly available to interested parties, through the Ghana Web Portal. The Ghana Standards Board's (GSB's) offices in Accra also houses a documentation and information centre (DIC). Through correspondence with the management of the centre, it was established that the DIC is a source for all Ghana's domestic standards for various product categories, including food. It also stocks regional and international standards, as well as collections from international and regional standards-setting bodies. The centre also holds technical regulations and conformity assessment procedures for products exported to various countries, books and other reference materials (ITC/GSB, 2009). A member of the management GSB indicated that domestic legislative instruments relevant to food safety are not hosted by the centre.

The Technical Barriers to Trade (TBT) enquiry point is hosted by GSB, and serves as a storehouse for information on all WTO notifications. It also houses all the recent regulations of other WTO member states to relevant stakeholders (ITC/GSB, 2009). It assists in answering local and foreign enquiries on any existing, proposed or adopted Standards, technical Regulations and Conformity Assessment Procedures in Ghana from other WTO Members.

The Ghana Export Promotion Council also serves as an information centre, which sources relevant publications to facilitate export performance of enterprises registered

[41] Beneficiaries must be registered in Ghana, and be wholly owned by Ghanaians or partly owned, with Ghanaian majority shareholding.

with them. One identified challenge is that the GEPC is also based in the capital city, Accra, and as a result initiatives are only accessible to a limited number of enterprises. Other avenues of information exist, such as the SPS & TBT web portal, which enables stakeholders to understand how TBT and SPS issues affect their trading activities.

Some information is available (e.g. licensed manufacturing plants and products registered, alerts on foods with imminent risk to the health and safety of consumers, magazines with information relevant to consumer understanding of the relevance of food safety and certain best practices), and some attempts are being made to communicate these to industry, mainly by publishing this information on the websites of regulators and using other media tools. The accessibility (and utility) of these pieces of information to those who need it the most raises a lot of questions. It is unclear how many consumers and food manufacturers access the websites of regulators regularly and hence are likely to come across such pieces of information. One has to visit the information centre in Accra to get access to both domestic and international documents and standards, relevant to food safety. As a result, adequate transparency with regards to industry (associations, retailers, manufacturers, and consumers) having adequate information about regulations and regulatory activities relevant to them cannot be claimed.

7.5.8.4 Laboratory Infrastructure

Official documents (Government of Ghana/World Bank, n.d) suggest that Ghana has the capability to meet most of the SPS standards, and SPS related analysis, however, these need to be strengthened to international certification level. Laboratory capabilities for the key institutions involved in food safety in the food manufacturing sector is reportedly increasingly. Three public institutions are involved in laboratory analysis for food safety verification and validation (Sefa-Dedeh et al, 2009). The Food Research Institute (FRI) which is a government institute mandated by law to conduct applied research into value added functions (food processing, preservation and storage) relevant to the food value chain, has accredited ISO laboratories for microbiological, and general chemical analysis. The Government of Ghana, United

Nations Industrial Development Organisation (UNIDO) and the Embassy of Switzerland's trade capacity building programme for enhancing the export performance of Ghana, has supported the upgrade of a number of laboratory infrastructural facilities. Those relevant to food manufacturing are:

- The microbiological laboratory of the Ghana standards Board, which was accredited to ISO 17025 in 2009;
- Pesticide residue lab of the Ghana Standards Board, which was also accredited to ISO 17025 in 2009;
- Microbiological Laboratory of the Food and Drugs Board.

Receiving accreditation for some of the laboratories being used for testing is essential because this means that the results produced from the accredited laboratories will be internationally accepted and this also demonstrates global recognition of their competence, impartiality and capability of some of Ghana's food safety infrastructure. There are other public laboratories housed by these public institutions which have not been accredited. For example, the GSB has a laboratory for testing heavy metal contaminants in addition to the accredited ones (Government of Ghana/World Bank, n.d.). The FDB also has a laboratory for testing adulterants, which is not accredited. A number of public research institutions e.g. the University of Ghana and the Kwame Nkrumah University of Science and Technology also have laboratory facilities in some departments, which have capability for various kinds of analysis of food. A number of private sector laboratories are springing up (Sefa-Dedeh et al., 2009). Notable among these is the MASLAB SGS Laboratory Services, which claims to be the first independent environment and food laboratory in Ghana which offers a wide range of field sampling and monitoring services as well as organic, inorganic and bacteriological analyses of a number of articles, including food. MASLAB is ISO 17025 accredited, and is sometimes contracted by international customers to undertake testing, inspection and audits on their behalf. The notable challenge to industry regarding the situation of most of the accredited laboratories (both public and private) is that they are situated in the capital city, Accra.

7.6 Status of Food Safety Assurance in Ghana

Documented evidence reviewed in this study so far suggests that there is an inherent aim of the government of Ghana (GoG) to protect consumer health and safety, and meet its international obligations towards food safety. There are currently some mechanisms in place, which are predominantly designed around product certification, and additional prerequisite programmes are added in specific export sectors to align practices to export markets.

Some regulators alluded to the fact that even though the current institutional and regulatory framework, and more generally capability does not meet the basic minimum international requirements, given available resources, the system is working at its best. Furthermore, there is no alarming indication that domestic consumer safety is at risk.

Statistics on food-borne illnesses, consumer confidence in current mechanisms and institutions for food safety assurance are not collated; neither is adequate data collected to investigate existing risks or new and emerging risks of food safety, so it is difficult if not impossible to confidently ascertain the current state of food safety in Ghana and in particular, in the food manufacturing sector, based on such statistics.

In spite of this, there are estimates that one in every 40 Ghanaians suffers food-borne illnesses each year (i.e. approximately 550 thousand people each year), with an annual death rate estimated at approximately 65 thousand[42] (Government of Ghana/World Bank, n. d.). Losses to the economy (due to e.g. lower labour output) are said to be considerable, with an estimate of US $ 300 million per year (Government of Ghana/World Bank, n. d.).

Perception of food safety in the manufacturing sector is divided. A small minority of respondents believe that manufactured food is safe, and a majority acknowledged that food safety is progressively improving, and that more could be done. Regulators were commended by food manufacturers on the basis that ordinary Ghanaians are

[42] This is a very cautious estimate as other sources suggest estimates above the stated of approximately 23%, and covers only a limited number of food borne diseases identified to be relevant to Ghana.

beginning to ask more questions about the use of the Ghana Standard Certification Mark and looking out for expiry dates.

7.7 Empirical Findings from Case Study

This section combines the data collected from the different stakeholders interviewed in this study with the intent to establish the factors in the manufacturing environment influencing compliance with food safety requirements in Ghana, the potential role of a technical regulation on the current state of food safety and by extension, the compliance of enterprises, amongst other alternative mechanisms for enhancing the compliance of enterprises with food safety requirements.

7.7.1 Overview: Food Manufacturers, Retailers and Suppliers

The enterprises involved in the case study were drawn from domestic, SMEs and large enterprises, and international SME and large enterprise. The scope of products covered areas in which Ghana seems to have a comparative advantage in as well as emerging areas with the potential for growth. Table 7-3 gives an overview of the enterprises involved. Four enterprises were already certified to one or more integrated third party audited standards, in addition to having the FDB registration and GSB certification. The remaining enterprises either had the FDB registration or the GSB certification. Some enterprises had both.

All the retailers were private enterprises, with Ghanaian owners, and served the domestic market only. In addition to this, one wholesales to other 1st tier retailers and remaining retailers sell directly to consumers. The raw material suppliers were international enterprises, privately owned, which served the domestic manufacturers.

Table 7-3: Overview of case study enterprises in Ghana

Food Enterprise	Size of Enterprise[43]	Ownership	Global Reach	Products	Markets	Customers	Food Safety Certification
FoodManCoGh1	SME	Public-Private	A domestic enterprise	Canned tuna	Europe & Africa	Retailers	IFS and BRC
FoodManCoGh2	SME	Public-private	A domestic enterprise	Flour	Only serves the domestic market	Wholesalers & retailers	GSB certificate
FoodManCoGh3	Large	Private	A Ghanaian domestic enterprise	Canned tuna	UK and Germany	Retailers	IFS & BRC
FoodManCoGh4	SME	Private	A Ghanaian domestic enterprise	Shea butter products	Europe, America, Asia & Africa	Branded manufacturers (international) & retailers in the domestic market	FDB registration & GSB certification
FoodManCoGh5	SME	Private	A Ghanaian domestic enterprise	Vegetable oils, jellies, soups	Europe, America & Africa	Retailers	FDB registration & GSB certification[44]
FoodManCoGh6	SME	Private	A Ghanaian domestic enterprise	Dairy products	Services only the domestic market	Retailers & vendors	GSB[45]
FoodManCoGh7	Large	Private	Have sister enterprises in Seychelles & Portugal	Canned tuna and frozen tuna loins	Europe & West Africa	Retailers and wholesalers	BRC,IFS, ISO 22000
FoodManCoGh8	SME	Public-private	A domestic enterprise	Cocoa products	America, & Europe	Branded manufacturers	FDB registration & GSB certification[46]
FoodManCoGh9	SME	Private	Have marketing facilities in the UK	Processed fresh fruits & juices	Mainly Europe	Retailers	BRC[47]

[43] Classification based on European Commission's classification of enterprises in terms of number of employees.
[44] FoodManCoGh5 has been asked by customers to implement an integrated process-based food safety system.
[45] FoodManCoGh6 started the FDB registration but quit due to frustrations characterising the process.
[46] FoodManCoGh8 is working towards ISO 22000.
[47] FoodManCoGH9 has Global GAP and Living Environment and Farming (LEAF) because the enterprise manages its own growers.

7.7.2 Enterprise Level Strategic Response to Food Safety

Enterprise-level strategic responses are essentially fashioned after the primary national strategic choice. Enterprises that are export-oriented respond to demands of their customers in international markets (reactive loyalty) by implementing the requirements of regulations recognised by them. This is the common practice. According to enterprises there are only two options: compliance or exit. Those that do not have the capability to comply with requirements apply the 'reactive exit' option, and attempt to service markets with less stringent requirements or quit production entirely. This pattern is corroborated by regulators who pointed out that before the requirements of EU concerning the fish and fishery products export, there were a significant number of exporters in the sector, however, after the introduction of the stringent export requirements, only a handful remain. Reactive voice is often not an option. According to FoodManCoGh7 enterprises often work individually and hence lack the collective voice to make significant impact. Also enterprises that participate in sector associations may be able to exhibit voice concerning the impact of control mechanisms on their activities, through their relevant sector associations, who serve as their voice and liaisons to sector regulators, however, active participation in sector associations are a rarity. Some manufacturers indicated that they were apart of the domestic technical committees (TCs) of regulatory agencies for some particular subsectors, and hence are able to influence the technical content of particular domestic standards and their governance process (proactive voice). Some export-oriented enterprises, with linkages with international research bodies claimed that these international institutions help them stay ahead of some international requirements for food safety as these international linkages are able to forecast regulations likely to emerge. This allows them more time to reorganise their operations in preparation towards the implementation and enforcement of new regulations.

7.7.3 Factors Influencing Compliance

Evidence collected in this study suggests that regulators of manufactured food in Ghana have been encouraging enterprises to adopt good practices relevant to food safety. While some regulators are reforming procedures because of the realisation that certain requirements previously applied as mandatory are in fact supposed to be voluntary, others are also tightening controls through the mandates given them to regulate food. Despite this there are a significant number of enterprises operating on the domestic market which have neither the FDB registration number and clearance, nor the Ghana Standards Certification Mark clearance/license to manufacture food for sale, either in the domestic or international market yet they trade successfully on the domestic market and according to the account of regulators, some are also able to send food products through the ports of exit. This reflects gaps within the current system of governance of food safety within Ghana (Reg7 & Reg10).

So far, this chapter has sought to understand the current institutional, regulatory and policy frameworks within the Ghanaian food manufacturing sector, and examined the frameworks against the backdrop of the author's reflections on what they mean and what they are expected to achieve and some supporting evidence from engaging with regulators, and other chain actors. The following sections draw on the interviews conducted to identify factors influencing compliance, on the basis of themes, categories and trends derived from the data.

7.7.3.1 Knowledge and Awareness

Three popular approaches were used by enterprises to stay up-to-date with information on domestic and international food safety requirements. All enterprises (both SMEs and large) relied on government regulators for information on domestic regulations and some international regulations. However, the terms of guaranteeing receipt of this information is reportedly when the enterprise is registered with regulators. This suggests that there is the possibility of some enterprises in the domestic contexts not knowing about new and emerging changes relevant to the

operations of their business. Some export-oriented enterprises had linkages with either international development cooperation partners, who furnished them with relevant information, sponsored them on international trade shows and conferences, or subscribed to research institutions aboard, who provide additional services e.g. as forecasting international regulations, providing customised advice on new technologies and processes for controlling food safety hazards. Because of the more formalised structures existing in the fish and fishery products sector and the cocoa sector, additional information is received through biannual technical committee meetings and the Cocoa Marketing Company (CMC) respectively, and these are always timely in nature.

The extent and ability of enterprises to access these sources of information introduces variability in their knowledge and awareness. Interviewees had limited knowledge and awareness of global public regulations; exceptions apply to participants from the fish and fishery products sector, who clearly understood the impact of global and regional requirements on their business. The majority (seven were export-oriented) of the food manufacturers were aware of the changes in the competitive landscape occurring at the global level, with regards to private global regulations and its potential impact on accessing the global food manufacturing value chain. They clearly understand that without compliance with, and certification to these international standards, their products would not be accepted into main stream branded retailers and as a result, are investing in compliance and certifications. An enterprise claimed lack of knowledge and clarity concerning what is required by even domestic statutory regulations and hence effects changes in the operations of the business based on the advice and guidance of regulators who visited. It was also identified that some enterprises have knowledge concerning both domestic and international regulations, and recognise the need to have some basic risk management procedures in place; however, do not see the need to comply with requirements to the degree expected by international markets. Their reason for this stance was attributed to their size and target market (mainly service the domestic market).

Size of enterprises has been linked to regulatory capacity (e.g. knowledge and awareness, funds, infrastructure) (see Yap & Fairman, 2006). The belief is that the more sophisticated risk management procedures like HACCP and the ISO 22000 international standards are for bigger enterprises, which have all the requisite resources and competencies to implement integrated food safety systems[48], and would also find it a more cost effective initiative. However, literature does not reflect the issue that enterprises (whether small or large) serving domestic markets, have no need for integrated risk management approaches.

7.7.3.2 Food Safety Professionals

Food safety professionals are reportedly essential for the effective design and implementation of food safety systems. On the basis of the data collected, the normal practice was for enterprises that have quality assurance (QA) managers or technical directors (TDs) to commission them, with the assistance of process owners to design, implement and maintain the food safety system. The QA manager and TD often have relevant degrees in subjects such as Food Science and Technology, and Chemistry, in addition to external training specific to certain food safety areas and these equipped them with the capability to design and implement the system.

The case is complicated for some SMEs who claimed not to have the resources to employ resident professionals with the competency to develop such systems. Enterprises therefore rely on the expert advice and guidance of state regulators to respond to food safety challenges that arise in the design and implementation of food safety systems. These enterprises indicated that the support received from government regulation with respect to the design, documentation and implementation of robust food safety systems is inadequate as regulators do not develop and implement the full system enterprises. From the account of one SME, when their potential customer in the UK requested a basic minimum requirement of HACCP, the lack of capability to develop the system motivated them to outsource to a freelance quality manager, with a degree in food science, but without certification relevant to

[48] This argument continues to resurface in other resource related challenges faced by enterprises in the implementation of food safety management systems.

the design and implementation of an integrated FSMS. The execution of the service was less than satisfactory and hence the service of a professional consultant was solicited, however, the costs involved were more than the enterprise could afford on its own.

7.7.3.3 Food Safety Training

State regulators are reportedly an affordable source of training for all enterprises (international, domestic, SME or large). The general concern, however, was that training by regulators was too generic. This was a very big issue for those who relied on state regulators to deliver all their training needs. For those enterprises who could afford it, quality assurance officers and technical directors are sent abroad for training, and others have resorted to online training programmes, which are organised by institutions abroad as a means of upgrading and ensuring that they keep up to date with the skills and competencies required to manage food safety in their enterprise.
For proof of due diligence purposes, personnel for specific job functions (e.g. internal auditors) were sent to accredited external training centres to be issued with certificates that are universally recognised. This was a common practice for enterprises with international certifications. External training centres offered a wider scope and more customised training; however, costs were inconceivably high, due to the limited number of such service providers in Ghana.

7.7.3.4 Laboratory Infrastructure

Majority of enterprises have laboratory facilities for verifying and validating controls associated with food safety, even though most of them are not accredited. For the purposes of accessing the GFMVC, accredited third party bodies are used, to get certificates of analysis (CoA) that are recognised globally. However, some domestic enterprises claim that the costs for laboratory analysis undertaken by 3rd party institutions are more than they can afford. As of July 2009, there was only one laboratory accredited to ISO 17025 in the whole of West and Central Africa. The

limited number of such laboratories means that there is no competition, which often controls costs.

Apart from the private 3rd party institution option, the GSB acts as an independent 3rd party conformity assessment body. Usually the services provided by government agencies are relatively cheaper; with the recent accreditation of some of its laboratories, certificates issued by the GSB would be recognised globally. The account of one enterprise reflects that samples sent for laboratory analysis, as part of the process for receiving a license to use the Ghana Standards Certification Mark took unreasonably long. This brings to question the availability of extra capability (human and infrastructural resource) of the national regulator to act both as a regulator and an independent conformity assessment body.

7.7.3.5 Financial Credit

The theme 'lack of access to affordable financial credit' to undertake food safety system implementation seemed to be the underlying factor for a significant number of the other thematic issues identified above. All manufacturers claimed that it was a key issue. According to them, affordable financial credit was either limited or not available. However, the account of one domestic, export-oriented SME differed. The respondent argued that affordable financial credit is available; and that requirements of financial institutions are not often met by SMEs, and in general those who apply for it. Furthermore most SMEs in particular do not put their enterprises in order, with regards to transparency, applying a formal structure and keeping documents that brings the credibility of the enterprise to light.

7.7.3.6 Culture

Some enterprises were of the view that some cultural practices and attitudes of individuals in enterprises inhibit compliance. The argument concerned the fact that some individuals in a position of influence, and hence agents of change are adamant that their current practices do not pose a risk to food safety. The defence of such potential change agents is that those practices have been used for several years and

have not as yet caused any damaged to human health. Others are of the view that the way food is cooked in Ghana, even if it is contaminated, food hazards will die during the cooking process. Other views raised concerned the fact that some individuals have a high tolerance for food with the potential to cause food borne diseases.

7.7.3.7 Supplier Management

On the basis of the data collected, manufacturers use the three conformity assessment methods (1st, 2nd, 3rd party conformity assessments (see section 2.2.2)) identified in literature to manage suppliers. Different patterns of supplier management emerged, depending on the sub-sectors enterprises belonged to and their chosen business models. Participants from the fish and fishery products sector had a four stage process, with the first stage managed by government regulators. This stage involved the approval of government regulators of the main raw material suppliers. Suppliers are hence selected based on certifications and approval issued by government regulators. Manufacturers then go for audits to ensure that suppliers meet their standards and requirements of their customers. Supplies are then expected to arrive with a declaration by the supplier of the status of the raw material, with regards to specific hazards (mostly biological and chemical in nature, as well as metal infusions). Manufacturers then conduct their own test to verify and validate the declarations by suppliers, in addition to checking for the organoleptic properties of supplies.

Government is significantly involved in the quality assurance process for the cocoa sector. According to respondents (including regulators of the sector), government institutions and agents collect the raw materials, analyse the quality and assigns batches to processors and manufacturers, however, some intermediary processes argue that government action focuses more on the quality attributes than on the food safety attributes of raw materials and hence assigned consignment have to be checked for food hazards.

Vertically integrated enterprises manage their own main raw material suppliers. This involves the hiring of a professional with the knowledge relevant to the particular

input materials, to train suppliers on best practices associated with the product and provide on hand advice. Suppliers are then supported to get relevant certifications.
There exists a fourth group of manufacturers, who buy their main raw materials inputs from the open market. No specific processes are in place to manage suppliers, and purchases are often influenced by price, and hence suppliers may change over time. As a result, there is no procedure to ensure that the raw material input to the manufacturing process is safe.

7.7.3.8 Manufacturer Behaviour

Some food manufacturers in Ghana have the tendency to deliberately render food injurious to health (Reg 8, Reg 9, Reg 12, FoodManCoGh7 and FoodManCoGh8). It was highlighted that, adulteration is one of the biggest challenges; food manufacturers deliberately add substances to food, with the intent to improve its volume and appearance, to make large profit margins. There was also the concern that other enterprises print a calendar on the product label and strike through the dates within which the product is to be used. The challenge identified with this approach is that retailers who are unable to sell the product within these dates tamper with the original dates, so that they can pass them on to consumers as within expiry dates. In other circumstances excessive handling makes these dates unreadable and hence consumers are unable to determine whether the product is within the dates acceptable for consumption.

7.7.3.9 Enforcements

The data collected indicates that regulator visits to enterprises are on the average, once a year; however, for those in the fish and fishery products sub-sector, regulators visited more frequently. Regulators claimed that the yearly visits were to enterprises with a good track record of compliance with requirement, and the recalcitrant non-compliant enterprises are visited more frequently. Enterprises held a different perspective to that held by regulators. They were of the view that enforcements efforts across industry were inconsistent (some sectors received more stringent

enforcement actions than others), and targeted bigger and easy to find enterprises, which have dealings with international retailers, and hence are compliant with both domestic and international food safety requirements. In the same vein available information reaches these bigger and easy to find enterprises.

Consequently, there are a considerable number of enterprises operating in the domestic market which have neither the FDB's registration number and clearance, nor a licence to use the Ghana Standards Certification Mark to trade either in the domestic or on the international market, yet trade successfully. And this does not create a fair playing field for compliance, as non-complying enterprises have a competitive edge in terms of operational cost over enterprises that comply.

Some regulators were criticised for striving to achieve compliance among enterprises, which were not even aware of their legal obligations and the expectations of statutory requirements. Furthermore, enterprises complained that in the quest of regulators to achieve compliance, adequate response time was not given to non-complying enterprises to allow them gather enough resources to comply. This meant that the operations of their enterprise were brought to a halt and hence they could not generate the needed funds to comply.

Before any enterprise can export manufactured food in Ghana, the enterprise is required to attach to the consignment, an export certificate, before clearance is allowed at the port of exit. Some enterprises complained that the process was bureaucratic to the point that sometimes their goods for export were rendered unsafe as a result of waiting at the ports for export clearance. In their defense, regulators argued that enterprises do not incorporate the time required to acquire export certificates into their planning. Some of them apply for export certificates on the day of export, however, the conformity assessment regulators are supposed to undertake before issuing a certificate may sometimes require more than a few hours and this is what delays exports and renders the manufactured food non-compliant with importing country's requirements. Regulators lamented that because of the lack of adequate cooperation and coordination between regulators and other support institutions responsible for final checks at the ports of exit, products meant for export sometimes

leave the shores of the country, even without export clearance from regulators. At the ports of importing countries, when consignments are identified to be non-compliant, the country is put on the radar of regulators in importing countries and the country's reputation to produce consistently high quality, safe products is ruined.

7.7.4 The Need for Reforms

Trends characterising food safety assurance indicated that changes are occurring in the competitive landscape with regards to the basic minimum criteria for qualifying for orders and having access to the GFMVC. The data collected demonstrate a shift to integrated approaches, supplemented by performance-based approaches. Assessments of the current institutional, legislative and policy framework, as well as infrastructure for assuring safe food in Ghana, and the current compliance of enterprises demonstrates that Ghana does not meet this requirement. As a consequence, the reputation of Ghana in relation to meeting the basic minimum statutory and private regulatory requirements of the international market is questionable, and hence the country's prospects of participating in global food value chains through increased exports of high value-added food products is uncertain. Compliance with these basic minimum requirements, particularly when they conform to the requirements of both multilateral and regional trade agreements, and are relevant to public health and safety is not negotiable. The current competitive landscape reflects the need for Ghana and its domestic enterprises to take initiatives to enhance compliance with the basic minimum food safety requirements, to reposition the sector and set the scene to meet the country's economic goals (section 1.3).

The government of Ghana and her development cooperation partners recognise the role of food safety in the socio-economic development of a country, and without an enhanced food safety status the prospects of access to the GFMVC will continue to be uncertain. Considerable domestic challenges will continue to limit the growth and productivity of actors in the domestic value chain. The major challenge for policy

makers, however, lies in reaching the right balance between all the elements interacting together:

1. The level of food safety that is 'safe' enough for the domestic market;
2. Compliance with the basic requirements of the international market;
3. The available resources of Ghana, including the current capability of enterprises;
4. The economic goals and aspirations of the country;
5. And developing a food control system that is recognised by the international community as adequate for consumer protection, and hence adequate enough to allow for manufactured food products from the country to access the GFMVC.

On the basis of insights gathered in this research (both from literature and particularly from the working case: the UK food and drinks sector), against the backdrop of the factors influencing compliance, a technical regulation designed within the context of integrated approaches (in this case HACCP) may be a catalyst to enhancing access. The following section hence seeks the perception of respondents on this issue.

7.7.4.1 Which Areas Should be Reformed?

All respondents were in agreement concerning the issue that considerable capability gaps exist at both the national and enterprise level with regards to meeting the basic requirements of food safety.

According to one regulator, government has a significant role to ensure that the status of food safety meets the basic requirements of the international market; however the role of government should be defined appropriately. The respondent argues that each government has its goals and decides which ministry to empower, and by extension, which government regulator to empower. E.g. the recent past government gave a lot of power to the FDB to certify enterprises through the advocacy work of the Minister of Health. The current government is more oriented to the GSB. This interferes with the consistency and effectiveness of regulator controls.

Regulators also need to be equipped with the technical skills and knowledge to understand and interpret requirements into documents that can easily be understood by enterprises, and guide them through the compliance roadmap.

Another regulator suggests that adequate resources should be provided for regulatory functions because currently regulators partly derive their funding from revenue generated from the provision of food safety services to industry and more staff is required on the field.

The need for more research into newer, cheaper, indigenous technologies and processing facilities was also highlighted amongst regulators. The argument was that, some of the contamination that occurs in food products are not done on purpose. Manufacturers are currently using specific methods and processing equipment and facilities that compromise the safety of the food.

According to some regulators, capability building for food safety assurance requires significant investments in administrative and institutional capacity, infrastructure and human capital, which cannot be raised/provided by government alone, however, the private sector (e.g. enterprises, sector association) needs to get involved to provide funding and support services. According to FoodManCo9 government should incentivise support service providers to set up in particular regions to increase access of enterprises to such services. On another note, respondents perceive that building model enterprises, representative of each sub-sector, and sector specific templates for the development and implementation of integrated FSMSs by government agencies would go a long way to give enterprises the practical guidelines to comply with food safety requirements.

7.7.5 Potential Role of a Technical Regulation Based on HACCP in Enhancing Compliance of Enterprises

The majority of respondents believe that the introduction of a technical regulation based on HACCP would enhance the status of food safety and the compliance of enterprises in Ghana (Figure 7-7). There were, however, varying views concerning the readiness of Ghana to apply an integrated measure across the whole food manufacturing sector, amidst the country's current capability gaps. Suggestions by some respondents are that it should be limited to bigger and export-oriented enterprises. FoodManAud1 held a different view.

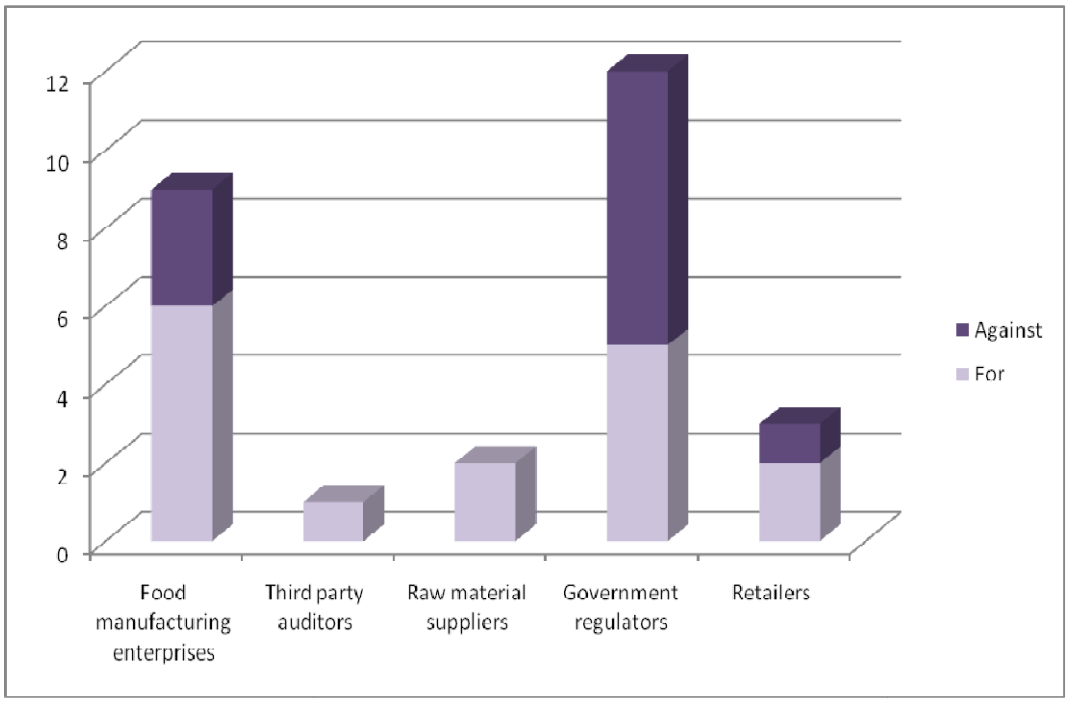


Figure 7-7: Responses on the potential role of a technical regulation based on HACCP in enhancing compliance of enterprises

This stance is shared by a regulator, who argued that the quest to improve export performance requires that HACCP and other integrated approaches to food safety be adopted, however, the prerogative should be left to export-oriented enterprises to decide whether to get certifications for food safety systems or not.

The group of respondents most opposed to a technical regulation based on HACCP was government regulators. A significant number of them perceived that Ghana is not ready for a technical regulation because of its current capability. Furthermore, concerns were also raised that a technical regulation meant that compliance should be 'taken as read', however, a significant number of enterprises do not have access to financial facilities (enterprises not credit worthy). Even when they do, the cost of financial credit is so high, and this cost will eventually become the burden of the consumer. However, it is unclear whether consumers, particularly the low-income earners are willing to pay or that they can even afford it.

For the majority of manufacturers, the motivation for advocating a technical regulation was on the basis of fairness on the market, and not so much about requiring for the implementation of integrated approaches. Other views expressed included the fact

that food safety concerned human life and that mandatory measures were the way forward, and would enhance access to international markets.

The raw material suppliers were all for a technical regulation. According to them the current food control system did not protect individual enterprises from going out of business, because according to them, the non-compliance of an enterprise on the international market, particularly in the EU market, gives an indication of the failures within the domestic governance system, and compromises the reputation of the whole sector. This increases the risk of the sector losing its export approval. Hence, a technical regulation would incentivise all enterprises to comply, raise the confidence of the international community and increase the confidence of domestic consumers in domestic manufactured food products.

7.7.6 Alternative Mechanisms to the Statutory Regulation

The notion that incentives will play a significant role in enhancing the compliance of enterprises with integrated food safety requirements was very popular amongst almost all categories of respondents. Some argued that there is a genuine lack of capability amongst chain actors, and this is a central reason for non-compliance by own volition. As a result, the provision of incentives that will address this lack of capability at the enterprise level has a potential to enhance the status of food safety in Ghana. There were suggestions around the provision of subsidized training, costs for laboratory analysis and soft loans. Furthermore, it was highlighted that the establishment of model enterprises specific to sub-sectors, which are up to scratch with relevant integrated requirements, and hence can act as live models to guide enterprises through the design and implementation process may facilitate compliance. See Figure 7-8 for an overview of emerging themes for alternative strategies for enhanced food safety status in Ghana.

Voluntary approaches were suggested by some enterprises as a viable option, but other respondents did not recognize this option as workable in Ghana because of the deliberate actions of some enterprises to render food injurious, and the lack of industrial capability.

Overall, respondents believe that consumers have a role to play in food safety control. However, consumers in Ghana have a limited role because of their limited knowledge of food safety and economic power. Consequently, they cannot solely change the behavior of food manufacturers.

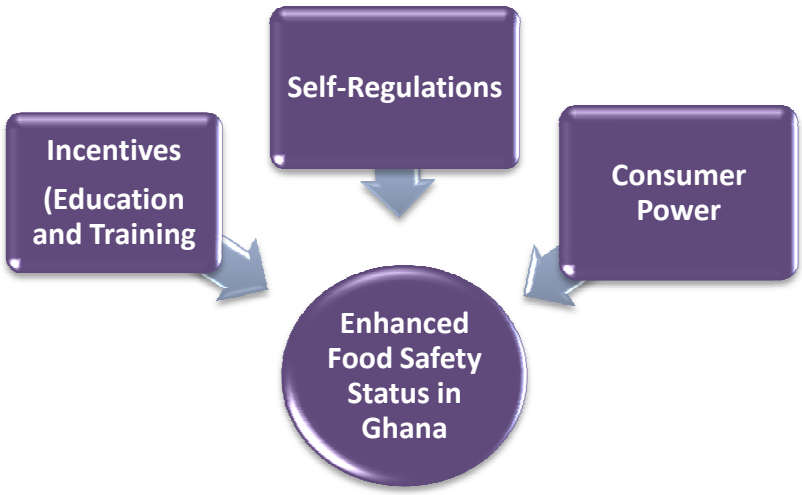


Figure 7-8: Themes emerging for alternative strategies for enhanced food safety status in Ghana

This is attributed to a significant number of consumers having limited disposable income and hence lacking the buying power to make choices on the basis of quality and safety. Furthermore, consumers lack the technical knowledge and full information required to facilitate effective decision making that can influence manufactures.

7.7.7 Chapter Summary

This chapter set out to investigate the current institutional arrangements for food safety assurance in Ghana, in terms of its capability to assure safe food. The factors influencing the compliance of food manufacturing enterprises with food safety requirements were also explored. The perceptions of relevant stakeholders regarding the potential role of a technical regulation, designed on the basis of HACCP was also investigated, among other options to enhance the compliance of the sector with food safety requirements.

The government has the intent to protect public health and safety, as well as meet the country's international obligations. In addition, there is an economic goal to enhance access to the GFMVC. Accordingly, there are some mechanisms which have strategically been implemented to assure food safety, based on what policy makers believe are the areas of comparative advantage for Ghana. A technical regulation and some standards have set out expectations from food enterprises, and laid out acceptable and unacceptable behaviour. An organisational arrangement has been implemented to enforce requirements and to ensure that enterprises respond positively to enacted regulations. As far as regulators are concerned, given the current resources, the food safety assurance system in Ghana is operating at its best. This 'best' does not however, meet the basic requirements of the international market, to ensure the adequate protection of public health and safety, and set the scene for meeting the economic goals of accessing the GFMVC, using high value-added products. Mechanisms upon which domestic institutional arrangements are based are lagging behind of what is conventionally accepted as best practices. Particularly, the food safety assurance system predominantly relies on performance-based approaches, when governance mechanisms have primarily shifted to integrated process-based approaches.

The mandates empowering regulators have not clearly delineated the roles and jurisdictions of institutions involved in food safety assurance in the manufacturing sector. Therefore there is a confusion of roles and responsibilities, which has cost implications for enterprises. No values have clearly been defined upon which the regulatory system is developed and implemented. Particularly, there is no food safety policy, strategy or even consistency in enforcement actions. Little transparency exists, with regards to regulatory operations amongst food authorities and information available to industry and consumers.

On a more general level, there are significant gaps in the elements implemented at the national level, which impact negatively on the response of enterprises to current institutional arrangements (Figure 7-9). There are concerns that enforcement actions are targeting bigger and easy to find enterprises, which are also the beneficiaries of

updates and information on regulations. Consequently, not all enterprises are complying. There are other issues concerning the genuine lack of capability of enterprises. However, some unethical practices are also evident among food manufacturers.

Given the current response of enterprises to frameworks in use, and the obvious institutional structure and operational gaps, the Ghanaian food manufacturing sector has not got a good reputation for producing safe food, and hence may not be able to meet its economic goal.

Reforms in the legal and institutional frameworks, in terms of incorporating the requirements for process-based approaches, clarifying the roles and responsibilities of regulators, and clearly defining operational mechanisms may address some of the challenges discussed. Furthermore, policies oriented towards capability development at the enterprise level may drive compliance with set requirements.

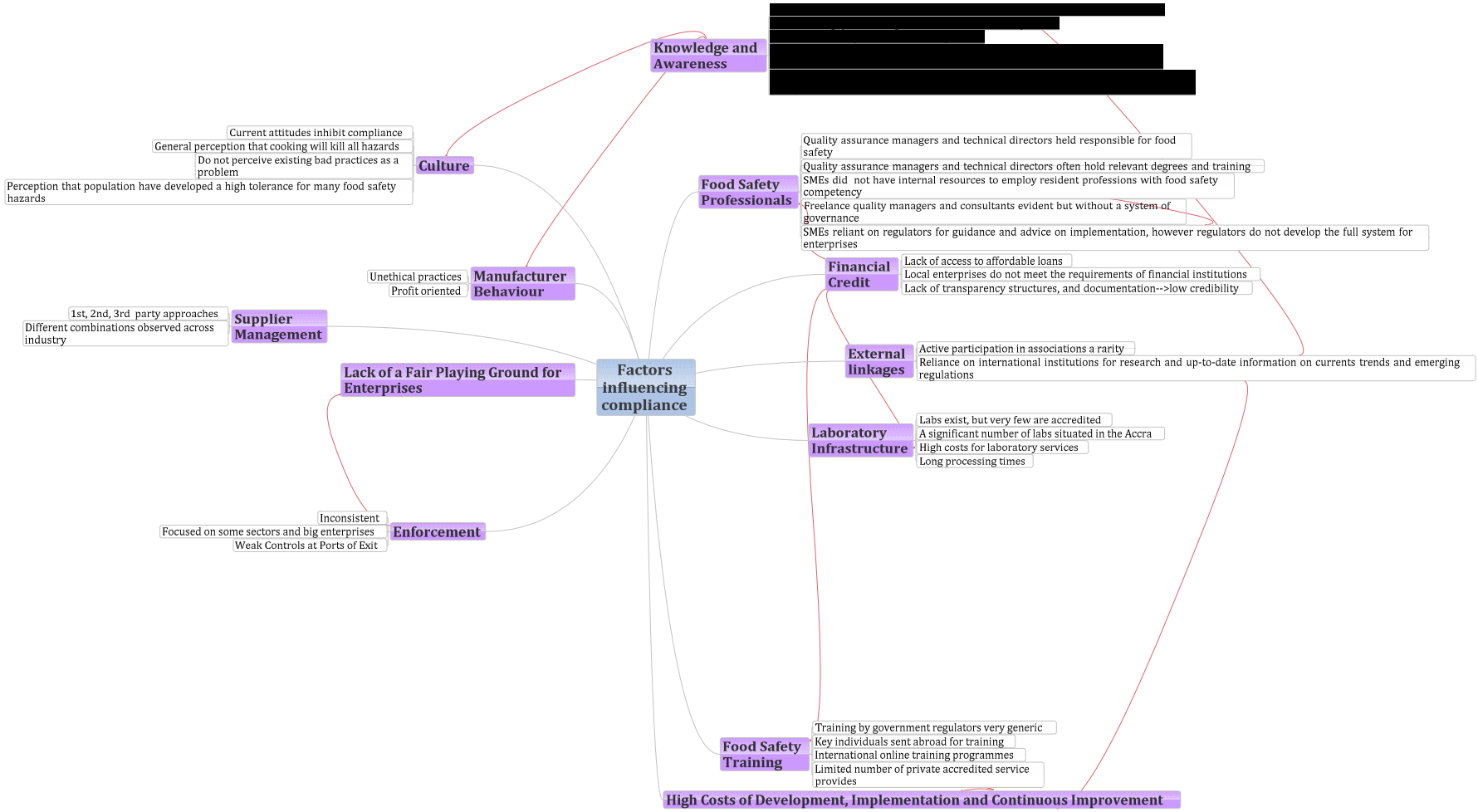


Figure 7-9: Factors influencing compliance of enterprises

CHAPTER 8: ENHANCING FOOD SAFETY CAPABILITY IN THE GHANAIAN FOOD MANUFACTURING VALUE CHAIN

This chapter presents the cross-case analysis of the manufacturing sectors of the two main countries of interest (the Ghanaian food manufacturing sector and the UK food and drinks sector) to re-emphasise the gaps in food safety assurance in the Ghanaian manufacturing value chain. The chapter coalesces the findings with regards to food safety assurance in the global food manufacturing value chain (GFMVC) from Chapters 6 and 7 with the extant literature to further highlight and discuss feasible options to address the major gaps identified in the Ghanaian context.

8.1 Strategic Response to Food Safety

The strategic response to food safety in the Ghanaian manufacturing sector is predominantly 'reactive loyalty', while in the UK food and drinks sector, it is predominantly a combination of both 'reactive and proactive loyalty'. This means that Ghana waits for requirements governing other countries to be introduced and then adopts measures to comply with them (hence reactive loyalty). The UK on the other develops mechanisms to respond to global and the EU food safety requirements; however, it also has the capability to anticipate future requirements and hence implements measures ahead of their introduction in regional and global contexts.

In Ghana, the strategic approach is selective of sectors and partly based on areas of comparative advantage in food. The UK uses a holistic approach. A basic minimum level of compliance is set by government across all sectors; however, depending on the evidence of risk, some sectors are exposed to greater scrutiny than others. This ensures that a certain level of food safety exists across all products, for all consumers, regardless of economic power, while capacity is released to address areas of the food safety system where outcomes need to be maximised.

Both approaches have their strengths and weaknesses. The selective approach allows scarce resources to be directed towards areas identified to have potential for growth and development, while the holistic approach applies a blanket solution to the sector.

This means more resource requirements are needed in the latter. The findings suggest that a holistic approach also has the potential to utilise resources optimally if the appropriate principles underlie it. Accordingly, a holistic approach could be an appropriate strategy even for contexts with limited resources. In terms of developing a reputation towards accessing the GFMVC, a holistic approach is more effective in demonstrating to importing countries the commitment by exporting countries to food safety, and developing a good reputation across the whole manufacturing sector. The approach also signals to food manufacturers that it is important that all food is safe regardless of which sector it fits into and whether it is for export or the domestic market. In addition, it also signals to manufacturers that a level playing field exists, and this has the potential to enhance their compliance.

From the extant literature and insights gathered from this study, a 'proactive' (i.e. proactive loyalty and voice) approach yields more strategic and economic gains as it affords sectors more time and scope to assess alternative mechanisms, administrative and institutional options to address food safety system failures.

Table 8-1: Comparative analysis of strategic response of the two country cases

Cases	Ghanaian Food Manufacturing Sector	UK Food and Drinks Sector	Insights Gathered from the Study
Strategic response	Reactive loyalty	Reactive and proactive loyalty	Proactive approach yields strategic and economic gain
Areas of good practice	Selective approach, with particular focus on: -Fish and fishery products sector -Cocoa products sector	Holistic approach – across all sectors	A holistic approach is most suitable to ensure adequate consumer protection.

The 'exit' option, in terms of accessing the GFMVC, is a legitimate strategic response. However, when it is applied in such a way that consumers in certain markets with inadequate and inappropriate food safety capability, and hence unable to restrict the imports of manufactured unsafe products, are exposed to imminent risk of food borne diseases and potentially death, then the right of every consumer to have access to safe food is breached.

8.2 Food Safety Capability

As was realised from Chapters 6 & 7, food safety capability comprises food laws and regulations, and organisational arrangements, with roles and responsibilities clarified. In addition, the elements of the institutional structure operate within mechanisms and rules that define the processes for ensuring that regulatory objectives are ultimately realised. The effectiveness of the system is realised within the context of shared values that guide the operation of the system, and which are supported by adequate resources. These are the elements that demonstrate to importing countries the commitment of exporting countries to food safety. From the evidence collected in this study, it was deduced that food safety is a concept that exists on its own, apart from quality, and should be an intrinsic part of every food product. It is not an attribute of food that should ideally be negotiated, based on economic power (or any other factor), as is the case in the concept of quality.

Decision-making regarding which countries and their enterprises get access to the GFMVC has two major components: assessing the capability of suppliers to comply with recognised food safety requirements and how competitive suppliers are relative to other competitors. However assessments of these major components are not done in isolation. Compliance with food safety requirements is considered as a first step in decision-making concerning which enterprises qualify for orders and ultimately get access to the GFMVC. The evidence gathered suggests that the decision to qualify and integrate countries and their food manufacturing enterprises can be made at the national level, as well as at the enterprise level. At the national level, the decision is based on the elements of capability mentioned above, coupled with the exporting country's ability to consistently supply safe food. This element of consistency facilitates the development of 'credibility and reputation' of the exporting country in the chain, with regards to capability to supply safe food. Based on available evidence of the credibility and reputation of the country, exports may be fully banned, partially banned, subjected to high scrutiny before being allowed entry into importing countries, or export approval may be granted to the exporting country. The receipt of export clearance at the national level, however, does not guarantee access and

participation in the GFMVC. Enterprises have to find potential customers and demonstrate their capability to supply safe food, in addition distinguishing themselves on competitive dimensions (e.g. quality, price, delivery performance and reliability) that govern the chain. On the other hand, an enterprise may secure orders, however, if the country does not have export clearance at the national level with regards to a particular product, participation of the enterprise in question may not be realised. This presupposes that food safety capability at the national level is as essential to accessing global value chains as food safety capability at the enterprise level.

8.2.1 Food Laws and Regulations

A regulatory approach is adopted by both Ghana and the UK to assure safe food in the manufacturing sector. The design of the regulations and how they are enforced in practice is however different. Food safety regulation, enforcements, monitoring, and the provision of food safety services in Ghana are primarily undertaken by government departments and their agencies. The case is different in the context of the UK food and drinks sector. One can almost say that the current state of the system is as a result of the joint efforts of both the government and the private sector.

The basic law for food safety assurance in the UK takes the form of a comprehensive and detailed text, which incorporates all the general provisions relevant to food (Table 3-5).This type of legal structure often leaves the specific procedures for enforcement to administrative authorities to define (FAO/WHO, 2003). However, the basic framework in the UK defines some procedures, in addition to giving administrative authorities the mandate to define the operational and delivery mechanisms, with regards to the enforcement of the basic law.

The mandate to make regulations given to relevant Ministers has been used to make secondary regulations to address specific aspects of the food value chain and enforce European Community regulations. These regulations, addressing aspects of food manufacturing not addressed in detail in the basic law, are published and easily accessible to interested parties, both within the domestic and international market.

The basic law for Ghana, on the other hand, lists a few general principles and sets up administrative structures to enforce the requirements of the law. Provisions have been made for relevant Ministers to make regulations to address specific issues e.g. food processing and manufacturing, however, no such regulations have so far been passed. Sefa-Dedeh et al, (2009), suggest that a draft Food and Drugs Regulations, 2000 has been proposed for adoption by the relevant regulator. Even though the regulation has not as yet been passed by Parliament the requirements are being used for operation by regulators. Table 8-2 compares some essential elements of the mechanisms in use both in Ghana and the UK.

Table 8-2: Comparison of the elements of the laws and regulations in the Ghana and the UK

	Ghana	UK
Basic law	Food and Drugs Act, 1992 and Food and Drugs Act, 1996	Food Safety Act 1990, as amended.
Secondary regulations	Draft Food and Drugs Regulation, 2000; Food and Drugs Bill, 2009	Consumer Protection Act 1987; General Food Regulation 2004; Food Hygiene (England) Regulation 2006.
Scope of provisions	Few general principles and sets up administrative structures to enforce the law.	Covers all general provisions as outlined in Table 3-5. Administrative structures are defined by other laws and regulations.
Basis of regulations	Predominantly based on performance approaches.	Predominantly based on integrated process-based approaches.

The two different approaches adopted by Ghana and the UK are recognised system approaches (FAO/WHO, 2003). The model used by Ghana is seen to be advantageous in terms of responding to the dynamics that characterise the food industry. The system in its ideal form is seen to be inherently flexible. Because the details of the legislation are usually confined to standards and regulations, changes that arise as a result of scientific advancements or new and emerging risks, can easily and quickly be amended by the relevant Minister without having to wait on Parliament to amend the basic law.

However, what is realised in the application of the model in Ghana is that this inherent flexibility has not been exploited to respond to changes characterising the GFMVC. Regulations proposed by the Food and Drugs Board since 2000 has not as yet been passed. New governance mechanisms and changes characterising food manufacturing, which have rendered the old legal and regulatory frameworks inadequate to ensure consumer protection and hence not good enough to qualify for orders and enhance the prospects of access of Ghana to the GFMVC are still in use.

This suggests that the effectiveness of the food safety system also lies in the content of the legal text elements of the model and how it is made operational in practice. The governance of the GFMVC places more emphasis on the use of integrated process-based approaches, however, the current regulatory framework in Ghana predominantly relies on performance-based approaches, and is enforcement-oriented as opposed to seeking compliance. This puts significant pressure on the resources of regulators. The UK legal and regulatory framework, on the other hand, has made integrated process-based food safety techniques the basis for food safety assurance.

The nature of the legal and regulatory framework in use in Ghana raises questions concerning the capability of the food manufacturing sector in Ghana to access the GFMVC. Both regulators and food manufacturers agree that the current legal text is not in good standing with the governance requirements globally because of some of the gaps discussed in Chapter 7, however, there is currently no high risk to domestic consumers. It must be noted here that while the current perception among regulators is that the current levels of compliance is good enough for domestic consumers, there is also an economic driver for the need for enhanced food safety levels in Ghana: accessing the GFMVC. Meeting this main goal would require that the gaps in the legal frameworks be addressed.

While the majority of respondents in Ghana perceive that the introduction of a technical regulation based on integrated process-based approaches, particularly HACCP techniques, would enhance the status of food safety and the compliance of enterprises in Ghana, regulators in particular are sceptical of whether it is the highest priority. According to them, there are antecedents that need to be addressed before

that significant step (of regulating integrated process-based approaches) is implemented. Responses particularly, reflect the need to address the lack of adequate resources of regulators and the genuine lack of capability among enterprises. Furthermore, the fundamental issue of lack of knowledge and awareness among industry and civil society needs to be addressed ahead of mandating integrated approaches.

8.2.2 Organisational Arrangement

An integrated organisational arrangement is implemented in the UK, as opposed to a multiple agency system in Ghana. The arrangement is decentralised, with local authorities playing a significant role in the enforcement of food law and regulations. Such a system is deemed effective as it provides coherence in the national food safety assurance system. Institutions involved in the enforcement of food law and regulations at each level (national, regional and local) know their roles and responsibilities in the system, and are clear about their jurisdictions. As a result, there are no conflicts or confusions over roles and responsibilities and jurisdictions.

The UK model makes use of an independent regulator, which takes responsibility for the development of food policy and standards, and the coordination of the other institutions involved in the enforcement of the food law and regulations. Specific mandates have been given to regulators by the law that established them, in addition to provisions made in the basic law and secondary regulations, to design operational and delivery mechanisms to cater for elements necessary for the effective working of the regulatory system, not accounted for by the basic law and secondary regulations.

In general the UK system reflects a model that is not tolerant of uncertainties and risks, and is highly structured, open and accountable.

The operational mechanisms and delivery requirements are well established, documented and published, and hence the system is transparent, even to industry and the international community. The values that form the basis for decision-making are evident. The views of all relevant stakeholders are taken into consideration in policy

decision-making. Annual reports of the operations of the Agency and audit reports of food authorities are published, as well as subjected to independent scrutiny.

A major challenge highlighted by regulators in Ghana is the lack of clarity concerning the roles and responsibilities of institutions involved in food safety assurance.

Table 8-3: A comparison of the institutional frameworks for food safety assurance in Ghana and the UK

	Ghana	UK
Organisational arrangement	Multiple agency system	Integrated agency system
Status of key regulator	Not clear	Independent regulator
Enforcements	Centralised to a degree	Highly decentralised
Operational mechanisms	Not clearly defined	-Codes of Practice -Framework Agreement -Agreement -Standards -Accreditation -Schemes for e.g. licensing
Operational delivery performance	Not clearly defined – some requirements for annual reports	-Regular assessments -Audits - Annual reports
Values	-No national food safety policy -No strategy -Limited transparency and accountability - Patchy risk analysis - Inconsistent enforcement -Ad hoc consumer representation and limited consumer input in the regulatory processes -Government interference at different levels	-No national food safety policy -Documented and published strategy -Increased openness and transparency in operations and accountability -Operates within a risk analysis framework -Enforcement targets high risk enterprises -A participatory approach -Minimum government involvement
Resources	-Significant percentage funded by government -Regulators being encouraged to go self-financing	-Full budget of regulators funded by government

Given the mandate of regulators and the model of regulation adopted, which leaves administrative structures to define operational procedures, there is an overlap of

institutional roles and responsibilities, as wells as confusion over jurisdictions. The costs of these uncertainties are passed onto enterprises in the form of double certifications, as a result, and this increases their cost burdens. Operational mechanisms are not clarified and hence adequate operational delivery mechanisms are also not established. There is a lack of clarity concerning which institution has the responsibility of oversight and coordination in the institutional structure at the national, regional or even district level. Consequently, there is lack of adequate coordination in the whole food safety system. The values guiding the system are not evident. There is limited consumer input in regulatory decision-making and the basis for decision-making is not clear.

The importance of a transparent and accountable regulator is demonstrated by the UK food safety assurance system. A significant amount of the information on the food safety assurance system used in this study was published and readily available. In addition, regulators were always ready to provide explanations or documents to further explain or clarify their current approaches to operations, and why those particular approaches are adopted.

While the governance of an independent regulator is suitable for an effective food safety assurance system, it is not a sufficient element for the effectiveness of the system, as is normally deemed to be in other sectors (Stern, 1997). The attraction of the independent regulatory model is first and foremost the independence from political influence it affords. Accordingly, the operations of food authorities are not interfered with. To the international community and trading partners, this is a particularly attractive element. Governments change over time, and each government comes with its own political agenda and policies. The interference of governments in the governance of food safety may mean that these changes are translated into the food safety assurance system. The element of uncertainty introduced is not desirable for predictability, and hence planning for international trading partners. The political system may be used to punish employees of Agencies for decisions and policies made (Berg, 2000), and may consequently lead to high staff turnover. However, because of the inherent dynamics associated with food safety and food in general, a stable team

would provide the advantage of the employees of institutions working with Agencies learning and understanding the manufacturing environment in which they operate and the drivers that affect the system, to make appropriate decisions. Furthermore, high staff turnover means new employees, and this may mean the introduction of new cultural elements and changes in values. However, changing these elements among employees often takes a long time (Stern, 1997), and this may affect the effective working of the food safety system.

Also, the uncertainty and staff turnover elements do not work very well for the development of credibility and reputation of regulators, which are particularly desirable in the context of enhancing access to the GFMVC. Credibility and reputation take a long time to develop. At the same time, they mean considerable formal as well as informal accountability to industry (consumers included), international trading partners and government; and this is facilitated by transparency. A basis for formal accountability is provided by the legal mandate which defines how regulators operate, and this provides some level of certainty for international markets. Formal accountability may be demonstrated through internal and independent reviews of the operations of regulators, matching them against the goals of the food safety regulatory system, and making outcomes readily available to interested parties. Informal accountability is demonstrated through incorporating the views of relevant stakeholders in the regulatory process. This includes incorporating the views of manufacturers and consumers into decision-making and the regulatory process in general. This will ensure that those relevant stakeholders understand the basis for decision-making, which could enhance compliance.

In the context of accessing the GFMVC, the international market is interested in establishing the adequacy of mechanisms employed to assure safe food and the values that guide the operation of the system. The international market is particularly interested to know whether the decision-making of regulators is based on sound and scientific risk analysis principles. Furthermore the feasibility of being able to identify and quickly respond to new and emerging risks will be demonstrated through current operational mechanisms and the structure of the organisational arrangement.

The GFMVC thrives on adequate and timely information to all relevant stakeholders. Their judgement therefore plays a significant role in creating and sustaining a reputation for fair and effective regulation. The perception of the international market concerning the values guiding the system will signal to them the potential response of regulators to international requests for information and technical requirements of particular processes, to inform their planning, decision-making and potentially strategies for mitigating the impacts of food safety system failures.

A significant amount of the resources required by regulators to execute their functions are provided for by government. The legal instrument which establishes administrative structures often defines who qualifies for an executive position; however, usually a mandate is given to regulators to employ technical staff as they deem fit to realise their regulatory functions.

The financial element (which includes salaries for employees of agencies) is often the responsibility of government. Different arrangements may exist, however, for laboratory infrastructure and the infrastructure for providing training services. What is observed in the UK is that government funds the full budget of regulators. The physical infrastructure for the provision of laboratory and training services are provided for by the private sector. The Agency employs the services of the private sector to make up for the areas where the Agency's resources cannot be stretched to accommodate.

The government plays a significant role in terms of the provision of resources in Ghana. The financial element is still the responsibility of government, and a significant amount of the laboratory infrastructure that is accredited also belongs to regulators or other government agencies. In terms of accredited training infrastructure, government agencies lack capability. The private sector role in terms of training and the provision of laboratory services is limited.

According to regulators in Ghana, government is encouraging them towards being self-financed. This is potentially a recipe for distracting regulators from the goals of the regulatory system. Running the process of assuring safe food as though it was a commercial activity, as is practiced in the provision of utility services to generate enough revenue to sustain the process would have huge negative implications for safe

food and the compliance of enterprises. This was reflected in the allusion of regulators when they suggested that the quest to derive enough revenue to fund regulatory activities was a motivation for the current practice of dual certifications for enterprises.

Even though independence is a desirable element in the regulation of food safety, particularly in terms of government not interfering in the operational aspects of the process, a self-financing financial structure may not work very well for food safety assurance. Even in the case of the UK, which uses an independent regulator model, government still holds the responsibility for providing financial resources for regulatory activities. Adequate financial as well as other resources need to be provided so that regulators can focus effectively on delivering their regulatory functions.

In the light of discussions above, it is realised that it is not the use of an independent regulator per se that guarantees the effectiveness of the food safety assurance system, but also how well the roles and responsibilities of institutions are clarified, operational mechanisms designed and recognised, and coordination organised to achieve the objectives of the system. A multiple agency system may therefore serve the same purpose if designed and implemented effectively, particularly with the elements of political interference eliminated or minimised.

8.2.3 Influence of the Manufacturing Environment on Compliance

Apart from the obvious role the private sector plays in the UK with regards to the provision of laboratory and training infrastructure, it has capability in terms of research and playing a regulatory role. The UK government is continually looking for opportunities to limit its involvement in industry by considering the feasibility of other policy alternatives to achieve regulatory goals. Statutory regulation is only to be resorted to where other alternatives are likely to fail or have failed. As was discussed in section 6.7.13 this effort has been motivated by the need to reduce administrative burdens on industry, and also because politically government cannot afford regulating all the problems of society. According to respondents in the UK, it is realised that where government is reducing its involvement in the food and drinks sector, industry,

particularly retailers, are continually raising the bar for food manufacturers due to their loyalty and commitment to consumers. This is because retailers potentially have got a lot to lose in the event that markets are disrupted. The case is different in Ghana. There is not a strong presence of retailers with powers and capabilities similar to retailers in the UK. The Ghanaian market is open, with limited private governance. It is a lot easier to directly access consumers without having to go through retailers. Other private sector associations and institutions present in Ghana have not got patronage from a significant number of enterprises, and this makes private governance of the domestic value chain difficult. The significant role industry plays in food safety assurance is illustrated by the following scenario. In both countries, what constitutes due diligence is not clearly defined by regulations. In the case of the UK, due diligence is to be determined by the courts in the context of the case presented, and is to take into account all facts in a particular case. What is realised in the UK is that, where statutory regulation is perceived not to be explicit on an issue, industry takes the liberty to define mechanisms in such a way that facilitates making operational the requirements at the manufacturer's level, based on evidence of good practice and what industry perceives as acceptable in dealing with the relevant issue. The use of third party certifications for instance is perceived by industry as a way of demonstrating due diligence at the basic minimum level. Industry perceives that making manufacturing operations transparent by allowing independent actors to assess compliance is a sure way of demonstrating that enterprises have fulfilled a certain level of diligence. The same cannot be said for the Ghanaian food manufacturing sector. The burden to determine what is best practice or acceptable, if not borne by government or adopted from international markets, is borne primarily by the individual enterprises, and this can be onerous both in terms of capital resources, time and money, and could potentially deter compliance.

8.2.4 Response of Enterprises to Food Safety Regulation

The discussion so far has highlighted two different approaches to food safety assurance. The UK situation in which requirements for both regulators and food

manufacturers are clarified (by either government regulation or self regulation of industry), and there is adequate support (through indirect government policy and private sector infrastructure for training, laboratory services and research output) for enterprises to facilitate compliance. In the Ghanaian situation, requirements, roles and responsibilities are not adequately clarified for relevant stakeholders. Support is limited and indigenous manufacturers are struggling to comply. Given the two models, the outcome of compliance realised in the Ghanaian food manufacturing sector is 40% as opposed to a 99% compliance level in the UK food and drinks sector. Manufacturers in the UK are applying internationally accepted best practices by incorporating requirements into the manufacturing process because of the awareness that without complying with those best practices they will be in breach of both statutory and private regulations. This could potentially mean an end to commercial activity. On the other hand, some food manufacturers in Ghana perceive that they can get away with non-compliance because of the current inefficiencies in controls and others are genuinely struggling to comply. Consequently, the sector is not in good standing with the international market.

8.2.5 Alternative Mechanisms to Statutory Regulation

The notion that self-regulation is a feasible alternative to statutory regulation of food safety came up both in Ghana and the UK. Respondents from both contexts however, suggested that an entirely self-regulatory approach may not be a feasible alternative because of the tendency for enterprises to be profit-oriented and exhibit opportunistic behaviour at the expense of the health and safety of consumers. Consequently, an element of compulsion would be necessary for the mechanism to be effective. This view reflects what is identified in literature as co-regulation, where industry formulates the 'rules of the game' and government provides the legal backing to enable enforcement.

While the exploitation of consumer power as a way of changing the behaviour of actors in the food value chain came up in both the UK and Ghana, there was also the recognition among respondents of the limitation of this approach. Allowing consumers

to take over the control of food safety through buying patterns reflects both a 'no intervention' and an 'information and education' theoretical stance. The former is essentially one way of allowing the market to sort out the market failure; however, it was highlighted that even a 'no intervention' approach would require some initiatives that would ensure that consumers have adequate information to make decisions (hence an information and education measure). The basis of this suggestion is rooted in consumers having enough disposable income, but this cannot be guaranteed for a significant number of the population of a country. Furthermore, even with increased disposable income, one cannot guarantee that the surplus of disposable income would be spent on high quality safe food to play the role of changing the behaviour of manufacturers effectively. Furthermore, the effectiveness of a food safety control approach entirely reliant on consumers would mean that consumers can adequately learn about the attributes of particular products; in this case the safety of products. It was established in section 3.3.1 that food qualifies both as an experience and a post experience good. These attributes of food limit the effectiveness of learning about the product due to information asymmetry. Consequently, through the learning process, consumers might come to harm, possibly death before they are able to learn adequately about the product, or brand. The effectiveness of consumer learning will depend on the product being homogenous and stable (in other words consistency of the manufacturer producing the same standard of safety every time). In that case the learning of consumers will be complete after limited encounter with the product, and a decision can be made on which brands to be loyal to. Evidence collected in this study suggests that achieving total homogeneity and stability in a product or a particular brand in practice, even in contexts where statutory regulation is implemented and enterprises are committed to food safety is difficult. Therefore exploiting consumer power as a means of addressing food safety system failures may not work effectively.

In Ghana, respondents perceived that while some of the actions that render food unsafe may be intentional, some others come about as a result of the lack of capability, and hence incentives that enhance enterprise level capability building may address food safety system failures.

8.3 The Objectives of Food Safety Regulation

The findings from both case study countries reflect objectives for food safety regulation that are common to both countries: ensure consumer safety, prevent fraud and ensure economic development. In the context of accessing the GFMVC, it is difficult if not impossible to decouple these objectives from each other. Even though the main driver for this project (and therefore Ghana) is the economic element, it is realised that gains in this respect would not be realised without addressing the other two elements. Therefore interventions introduced to facilitate the realisation of the economic development objective should be designed in such a way that it meets the other two objectives (ensure consumer safety and prevent fraud) while maximising the potential to achieve the economic goals of Ghana.

8.4 Proposed Options for Enhancing Food Safety Capability in Ghana

The findings from the two country case studies demonstrate the strengths and weaknesses in the application of the various elements of food safety capability, and their role in enhancing access to the GFMVC. The results from Ghana, in particular, illustrate the impact of the lack of adequate capability on compliance with food safety requirements. A variety of interventions and initiatives may address the gaps in the Ghanaian context to ensure an enhanced access to the GFMVC. There is the need for reforms in the current legal (or policy) framework to take into consideration international best practices and codes of good practice. The mandates of institutions involved in food safety assurance need to be revised and clarified, with appropriate mechanisms for operation defined to ensure that operations meet the goals of the regulatory system. There is a clear need for the application of risk analysis techniques, and change in values guiding the execution of regulatory functions. More resources are also needed to facilitate the execution of regulatory functions.

Even with the upgrade of state institutional mechanisms and processes, the findings suggest that enterprises require support in a variety of areas in order to enhance their compliance. Increased awareness is also required across all stakeholders to ensure the

effectiveness of interventions and initiatives implemented at both the national and enterprise level.

8.4.1 Addressing Gaps in the Policy Frameworks

A number of mechanisms have been identified from theoretical and practice literature that could be adopted to address the gaps in the policy framework in Ghana (Table 3-3, Table 3-6). The practice literature suggests the application of statutory regulation in a number of countries: USA, UK, Australia, New Zealand, Kenya, Nigeria and even in Ghana. However, what we realize is that statutory regulation may take different forms as discussed in section 3.3.2.3. As a result, in some circumstances, it may even overlap with some of the distinct policy alternatives touted as being non-regulatory. For example, in the situation of using information and education as a distinct mechanism to address food safety system failures, through ensuring that consumers have adequate information to make decisions, government may provide information to consumers, or advise enterprises to provide information to consumers; however, in statutory regulation, government might incorporate both voluntary and mandatory information requirements as well. This way, more than one mechanism is applied: one playing a dominant role and the other a supporting role. The same structure (a dominant mechanism and one or more mechanisms playing a supporting role) may apply when self-regulatory approaches or even a partnership approach (co-regulation) is used in any country context. We also realize from the perceptions of respondents and literature (e.g. Sinclair, 1997; Baldwin & Cave, 1999) that even essentially self-regulatory and non-regulatory approaches may have some elements of compulsion (e.g. from peers or even from the fear that if self-regulation fails, government may intervene, and in other non-regulatory approaches, rules may be required to effectively implement the policy) for it to work effectively. In addition, it is also realised that 'targets', which are often classified as one of the ways of implementing incentives and market mechanisms, may also form a part of statutory regulation in the form of liability laws.

In addition to the above, literature on regulatory governance and environmental management suggest that there may be situations where the best policy alternative may be for no intervention to be implemented. This may be in situations where e.g. policy makers deduce after undertaking a cost benefit analysis that intervening in the relevant issue would yield more costs than benefits or more problems would be created than would be solved. This demonstrates the complexity of the policy decision for addressing food safety system failures.

Best practices with regards to effective regulation suggest that a regulatory impact analysis (RIA) be conducted prior to the introduction of a regulatory (or policy in this case) intervention, which incorporates a cost benefit analysis of proposed regulation and alternative mechanisms that might achieve the given regulatory objective at a lower cost. Even though RIAs assist policy makers to prioritise and choose the mechanisms that will yield the most or a surplus of benefits, they are difficult to carry out and require a significant amount of data for interpretation (FAO/WHO, 2003).

The data needed to conduct a quantitative cost-benefit analysis (including the cost of compliance) of the potential impacts of the various mechanisms on different stakeholders was not available to make an objective decision on which mechanisms (could play a dominant or supporting role) could address the policy gaps in Ghana and yield a surplus of benefits.

Insights gathered from this study suggest that making a choice amongst policy options requires that policy makers take into consideration the features of available mechanisms, circumstances that may require particular mechanisms (regulatory variables) and the unique contextual characteristics of the country of interest (see Chapters 1 & 7 for the economic goals and contextual characteristics of Ghana with regards to exports). Table 8-4 gives an overview of the characteristics of available mechanisms to address food safety system failures. Section 3.3.2.2 is dedicated to regulatory variables, however, at different sections in this thesis regulatory variables are alluded to. The regulatory variables are structured into a hierarchy in Figure 8-1.

Given that the majority of respondents in Ghana perceive the introduction of a technical regulation based on HACCP as a viable policy option to address food safety

system failures in Ghana, and the role HACCP plays in ensuring access to the GFMVC, this study would have at this point proposed a technical regulation based on HACCP for Ghana. However, because of the influence of other factors (apart from the potential surplus of benefits) on the choice of policy options, and the compliance of enterprises with enacted regulation, these factors need to be considered. As a result, the following section evaluates policy alternatives for food safety assurance in Ghana, based on the regulatory variables identified from literature and contextualised to Ghana. Insights gathered from this study in relation to the factors militating access to the GFMVC and the knowledge of Analytical Hierarchical Process (AHP) (Saaty, 2006) was used to facilitate the policy evaluation.

Table 8-4 : Strengths and weaknesses of policy alternatives

Policy alternatives	Strengths	Weaknesses	References
Statutory regulations (command and control)	• Force of law; • Fixed basic minimum acceptable levels of standards of behaviour; • Screens entry; • Prohibits unacceptable behaviour immediately; • Seen as highly protective of public; • Use of penalties indicates forceful stance by authorities.	• Prone to capture; • Complex rules tend to multiply; • Has the tendency to be inflexible; • Informational requirements severe; • Expensive to administer; • Setting standards is difficult and costly; • Incentive drives enterprises to comply with the basic minimum; • Stifles innovation; • May inhibit desirable behaviour.	Nash and Ehrenfeld, 1996; Sinclair, 1997; Baldwin and Cave, 1999;
Self regulation	• High commitment to own rules; • Low costs to government; • Enforcement efficiency; • Comprehensive rules; • Well-informed rule-making; • Offers enterprises guidance in establishing policies and management systems; • Flexibility; • Can combine with external oversight.	• High cost of approving rules; • Rules may be self-serving; • Legalism not necessarily avoided; • Rule making procedures may be closed to consumers or the public; • Enforcement may be weak or may favour industry; • Legal oversight may be problematic; • Public may want governmental to take responsibility.	Nash and Ehrenfeld, 1996; Baldwin and Cave, 1999;
Incentive/market-based mechanisms	• Low regulator discretion; • Low-cost application; • Low intervention in management; • Incentive to reduce harm not just to the basic minimum standard; • Economic pressure to behave acceptably; • Consumers can make decisions based on what they deem fit.	• Rules are required; • Poor response to problems arising from irrational or careless behaviour. • Predicting outcome from given incentive difficult; • Enterprises may be motivated to achieve certain outcomes at the expense of others; • Mechanical, so inflexible; • Regulatory lag; • Politically contentious as rewards wrong doer and fails to prohibit offence.	Baldwin and Cave, 1999;BRE, 2003
Information and Education	• Low intervention; • Allows consumers to decide issues; • Lower danger of capture; • Useful in low-risk sectors.	• Information users may make mistakes; • Economic incentives (e.g. price) may prevail over information (on e.g. risk); • Provision of information and education can be costly; • Risk may be so severe as to call for prohibition; • Policing of information quality and fraud may be required; • Information may be in form undermining its utility; • Information may not be accessible to all relevant stakeholders	Baldwin and Cave, 1999; BRE,2003
No intervention	• No costs to industry • No costs to government • Likely alternative where regulatory intervention would be difficult or impossible. • Likely alternative when the objectives of the regulatory system seem unlikely to justify the costs of regulation. • Likely alternative when intervening in a market that is not operating perfectly seems likely to cause more problems than it solves	• May not militate unacceptable behaviour • Consumers may be exposed to high risks • Industry may act at the expense of consumers to optimise their gains	BRE, 2003 and authors own analysis.

8.4.2 Approach: Analytical Hierarchical Process (AHP)

The Analytical Hierarchical Process (AHP) is particularly suited to decision making that requires a compromise of a sort (Saaty, 2006). AHP is a decision–aiding tool for dealing with complex, interrelated multi-criteria decision making. AHP makes use of both an objective and subjective approach in a system's way, and provides a structured yet relatively simple solution to decision-making problems.

Decision making using the AHP involves structuring the research problem as a hierarchy or network of dependent loops, eliciting judgements that reflect relationships about the elements in the hierarchy and assigning numbers to those judgments. The consistency of the judgements is then computed, and if satisfactory, priorities are then calculated for the elements of the hierarchy. The results are synthesised to determine an overall ranking of the candidate alternatives.

8.4.3 Hierarchy of Food Safety Regulatory Variables

The food safety issue being addressed is structured into a hierarchy of four levels, drawing on the guidelines of Saaty (2006), with the goal of the analysis on top (level 1). The goal is to select an appropriate overriding policy alternative for food safety assurance in Ghana that will enhance the access of the food manufacturing sector to the GFMVC. The food safety issue is then broken down into smaller subject component areas, on the basis of regulatory variable (main criteria – level 2) with an influence on what policy alternatives might work in particular circumstances. Each main criterion is then broken down into sub-criteria (level 3) with an influence on a particular main criterion in level 2. Even though there are dependencies between these categories, they are each treated separately because each item represents a main aspect of regulatory variables. The fourth level compares the available policy alternatives against the sub-criteria at level three. Each sub-criterion is mapped unto the six potential policy alternatives as illustrated in Figure 8-1.

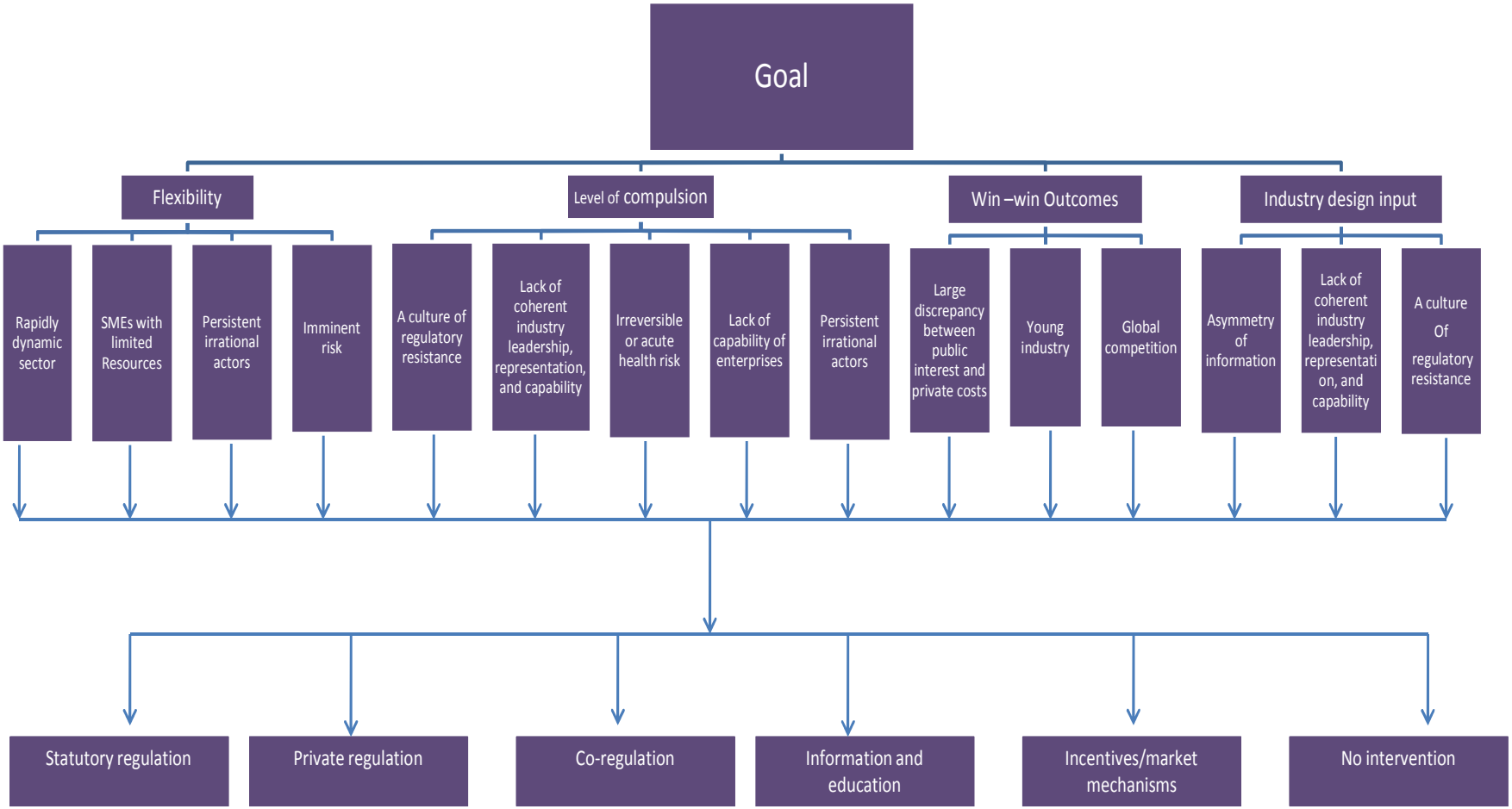


Figure 8-1: Hierarchy of food safety regulatory variables

8.4.4 Weighting the Food Safety Regulatory Variables

AHP uses ratio scales of relative magnitude of a set of elements by making paired comparisons of the criteria at each level in the hierarchy. A numerical representation is given to the relationship between the variables compared, with respect to the importance of a property which the two paired elements have in common. A ratio scale is derived. The comparison makes use of judgements based on the knowledge and experience of the decision maker, to interpret data according to their contribution to the parent node in the level immediately above it. Saaty (see Saaty, 2006) has developed an influence rating scale which is used for defining the ratios of the pair wise comparisons (see Table 8-5).

Table 8-5: Influence rating scale

Numerical values	Definition
1	Equal influence
3	Slightly more influence
5	More influence
7	Severe influence
9	Extremely severe influence
2,4,6,8	Intermediate values to reflect compromise

(Source: Saaty, 2006)

A relative priority scale is then derived from the pair-wise comparison in a set of criteria influencing the goal. This step is repeated for all sub-criteria on all levels.

Judgements for the second level of the hierarchy are made relative to the goal and this is recorded in a matrix (Table 8-6). The matrix should be a square matrix (n*n) matrix. That is, there must be as many rows as there are columns.

Table 8-6: Matrix of judgements for the goal (Matrix A)

Goal	Criteria 1	Criteria 2	Criteria 3	Priority
Criteria 1	1	a_{12}	a_{13}	b_1
Criteria 2	$1/a_{21}$	1	a_{23}	b_2
Criteria 3	$1/a_{13}$	$1/a_{23}$	1	b_3

A criterion is equally important when compared with itself; consequently, where the row 'I' and column 'I' meet, one (1) is obtained (see Table 8-6). The inverse of the outcome of the comparison of column 'I' with row 'J,' becomes the outcome of the comparison with column 'J' with row 'I'. The numbers in the priorities column of Table 8-6 are the components of the Eigen vector of the matrix, which implies that:

$$AW = \lambda_{max} W \qquad \text{Equation 9}$$

Where W is the Eigen vector of the matrix A.

λ_{max}, the principal Eigen value is computed to satisfy Equation 10. Consistency in the judgement is checked with the Consistency Ratio (CR), which indicates whether the judgements are satisfactory.

$$\text{Consistency Ration (CR)} = CI/RI \qquad \text{Equation 10}$$

Where CI is the Consistency Index (CI)

$$CI = (\lambda_{max} - n)/n-1 \qquad \text{Equation 11}$$

RI is the Random Index (RI) (Saaty, 2006). Standard Random Indexes have been generated for different sizes of square matrices (see Table 8-7).

Table 8-7: Standard Random Indexes

n	1	2	3	4	5	6	7	8	9
R. I	0	0	0.52	0.89	1.11	1.25	1.35	1.40	1.45

CR is acceptable if it does not exceed 0.10 (Saaty, 2006). If it is greater than 0.10, the judgement matrix is not consistent. If a Consistency Ratio exceeds 0.10, judgements should be reviewed and improved by the relevant person.

This process is repeated for all criteria at all levels in the hierarchy. The local priority of the six policy alternatives for each sub criteria is used to compute the overall rank by weighting each of the scores for each alternative by the priority of the criteria above it and summing the results. The highest ranking policy alternative is then selected as the overriding policy alternative appropriate for Ghana, based on the data collected.

8.4.5 Results of the Evaluation of Policy Alternatives

The priorities emerging from the four main criteria at level 2 in the hierarchy is shown in descending order in Table 8-8. 'Level of compulsion' emerged as the highest priority, and 'flexibility' as the lowest priority in terms of regulatory variables. Even though flexibility is a very desirable element in the food industry, analysing the need for flexibility vis-à-vis other factors militating the compliance of enterprises in the context of enhancing access to the GFMVC has reduced the significance of the desirability of flexibility in selecting a policy alternative for Ghana.

The results of the analysis of the sub-criteria (level 3) with respect to the main criteria (level 2) give the local priorities. The global priorities are the results of the priorities of the sub-criteria (level 3) with respect to the goal (level 1) (see Table 8-9, Table 8-10, Table 8-11, and Table 8-12). From these tables it is realised that the judgments were all consistent within the 0.1 cut off point set by Saaty (2006). The results of the policy alternatives (level 4) with respect to the sub-criteria (level 3) are shown in APPENDIX N.

Table 8-8: Level 2 analysis with respect to the goal

Goal	Priorities
Level of compulsion	0.5153
Win-win outcomes	0.2871
Industry design input	0.1337
Flexibility	0.0639
Consistency Ration (CR)=CI/RI	0.0749

Table 8-9: Flexibility- level 3 analysis with respect to the goal

Flexibility 0.06	Local	Global
Rapidly dynamic sector	0.5573	0.0334
SMEs with limited resources	0.3264	0.0196
Persistent irrational actors	0.0711	0.0043
Imminent risk	0.0451	0.0027
CR=CI/RI	0.0187	

Table 8-10: Level of compulsion-level 3 analysis with respect to the goal

Level of compulsion 0.52	Local	Global
A culture of regulatory resistance	0.0757	0.0394
Lack of coherent industry leadership, representation, and capability	0.1108	0.0576
Irreversible or acute health risk	0.2847	0.1481
Lack of capability of enterprises	0.0657	0.0342
Persistent irrational actors	0.4630	0.2408
CR=CI/RI	0.0901	

Table 8-11: Win-win outcomes- level 3 analysis with respect to the goal

Win-win outcomes 0.29	Local	Global
Large discrepancy between public interest and private costs	0.0199	0.0058
Young industry	0.4570	0.1325
Global competition	0.5231	0.1517
CR=CI/RI	0.0192	

Table 8-12: Industry design input – level 3 analysis with respect to the goal

Industry design input 0.13	Local	Global
Asymmetry of information	0.1913	0.0249
Lack of coherent industry leadership, representation, and capability	0.1745	0.0227
A culture of regulatory resistance	0.6342	0.0824
CR=CI/RI	0.000	

From Table 8-13 it is realised that the various factors influencing the choice of policy option to address the gaps in policy in Ghana yielded 'statutory regulation' as the topmost priority. This essentially means that in order to realise the developmental goal of enhancing the access of the Ghanaian food manufacturing sector to the GFMVC, a technical regulation based on internationally accepted best practice, making use of Hazard Analysis and Critical Control Point (HACCP) is required to enhance the compliance of enterprises with food safety requirements.

Table 8-13: Results of the policy evaluation

Policy Alternatives	Priorities
Statutory regulation	0.3212
Information and education	0.1950
Co-regulation	0.1899
Incentives/market mechanisms	0.1860
Self-regulation	0.1186
No intervention	0.0511

By making HACCP the basis of the legal text, the statutory regulation is flexible as it does not specify how enterprises should achieve compliance. This flexibility is good both for regulators and for industry. For the former, it allows for the rapid changes usually characterising the GFMVC to be easily incorporated into food safety requirements without having to change the legal text significantly. For the latter, this flexibility means they can develop food safety systems that are proportionate both in terms of the size of improvement required and the nature of the improvement.

With the developmental goals of Ghana and its current state with respect to food safety capability, a 'no intervention' policy is not an option. An entirely self-regulatory approach is also not a feasible overriding policy option because of the lack of coherence, commitment and capability of industry. The study acknowledges that statutory regulation of HACCP would have to be complemented with other mechanisms such as the provision of information and education to relevant stakeholders and provision of various kinds of support to enterprises to enhance compliance.

Reflecting on the legal text in light of insights gathered and lessons learnt from the UK, this study recommends that in addition to developing a technical regulation based on integrated process-based approaches, the following reforms should also be incorporated:

- A duty of care should be placed on food manufacturers to ensure food safety.
- A mandatory requirement for training.
- A requirement for traceability up to a point in the value chain.
- Registration of products /licensing of premises.
- A requirement for manufacturers to update regulators with information on changes to their product or manufacturing operations.

The legal text also suggested requirements that were equivocal. In this way, the requirements could be interpreted differently by different stakeholders and make enforcements difficult for regulators. Requirements such as '*appropriate knowledge and qualification*', '*unhygienic condition' and 'due diligence'* in the legal *text* need to be defined in a language that is understood by enterprises to facilitate an understanding and compliance with their regulatory obligations. Unlike in the case of the UK where industry takes the liberty to research extensively into food safety and define guidelines to make operational these requirements, the Ghanaian food sector lacks this capability, thus the responsibility for interpreting regulations lies with individual manufacturers. It is therefore imperative that government enacts regulations which are comprehensive but also in a language which is unequivocal to lighten the load of regulatory compliance on enterprises.

8.4.6 Addressing Institutional Gaps

The findings from the study suggest a multiple agency system is currently in operation in Ghana. As noted in section 8.2.2 the use of a multiple agency organisational arrangement per se is not the overriding source of the ineffectiveness characterising the delivery of regulatory functions. The findings point towards the lack of a clear and adequate mandate for institutions involved in the regulation of food safety in the manufacturing sector, and the lack of clear operational mechanisms and delivery performance requirements. This study proposes that the current structure of a multiple agency system be maintained, in line with suggestions from regulators. Regulators currently have infrastructural capacity in certain areas and human resources, and hence a complete rationalisation of these resources to conform to the popular integrated agency system, with an independent regulator might take a long time to implement and might also not be logistically convenient or even feasible. However, reforms are required in a variety of areas to bring the operations of regulators in line with pragmatic and recognised international best practices such as:

- Clearly defining the goals, objectives and strategy of regulatory institution;
- Clarifying mandates and jurisdictions;
- Applying risk analysis techniques;
- Separating risk analysis from risk management functions;

- Decentralising regulatory roles and functions to regions and districts, and clearly naming institutions with oversight responsibilities;
- Adopting a participatory approach, with increased involvement of relevant stakeholders, in particular consumers, in the regulatory process;
- Development of guidelines to facilitate industry's understanding of enacted regulation and their applicability to manufacturing operations;
- Developing monitoring and surveillance systems;
- Developing an institution to oversee certification and accreditation in Ghana;
- Continuous public financing for regulatory functions.

As highlighted in section 8.2.2, transparency, independence and accountability are very desirable values in terms of regulatory governance in the context of accessing the GFMVC. Transparency and accountability are related in many ways (Stern, 1997). Consequently, by ensuring transparency, regulators are also made accountable.

The operations of regulators need to be open to industry, government and to the international community. This can be achieved in a number of ways (Table 8-14). The international community is better able to understand the food safety system and this facilitates the development of reputation and credibility. A transparent and accountable organisational arrangement does not only benefit the international community and industry, but also regulators, in terms of having a fresh pair of eyes to identify where functions are falling short so that they could be remedied. However, if it is also realised that regulators are delivering on their objectives, they could also be commended. Furthermore, instead of industry constantly approaching regulators to seek understanding and clarity on certain aspects of the regulatory system and on compliance, thus taking away valuable time of regulators, information sources made readily accessible to industry will provide answers and guidelines to areas of interest to industry. At the same time, operating an open regulatory system will allow for an independent perception of whether the resources given to regulators are adequate to achieve their regulatory functions.

Table 8-14: Mode of enhancing transparency

Mode of enhancing transparency	Primary Beneficiaries
• Making information on the mandates and operations of regulators accessible;	• International community • Industry
• Developing and publishing the operational mechanisms and the values that guide the decision making of regulators;	• Regulators • International community • Industry
• Developing and publishing mechanisms for assessing and incorporating private actors into regulatory functions	• Industry • Regulators • International community
• Making accessible to civil society the annual reports, including the financial reports of regulators;	• Regulators • Industry • Consumers
• Making regulatory functions and operations open to independent scrutiny;	• Regulators • International community • Industry
• Development of guidelines and codes of practices;	• Industry, in particular, food manufacturers • Regulators • International community

As was highlighted in section 7.5.8.1, there is considerable scope for political meddling in terms of the appointment of the members of the governing bodies of regulators (also known as the members of the Board) and the employment of other employees of regulators. Furthermore, the use of public funding sources for supporting regulatory functions also provides a huge avenue for political interference as highlighted in section 8.2.2. Whereas structural and functional independence is desirable, this study realises that financial independence is not desirable in the food safety assurance process, and therefore recommends that government still hold this responsibility at least until industry has developed enough capability to take over the governance of food safety. It must be noted here however, that even in that circumstance, the functions of regulators will not be

entirely eliminated and some form of public funds will still be required to keep the regulatory system running at a certain minimum standard.

This underscores the essential role government has in enhancing food safety capability in Ghana. However, as suggested by regulators, this role should be adequately defined so as not to unduly interfere with regulatory operations and decision making by regulators.

Food safety assurance through regulatory means is expensive. Whatever institutional arrangements are made or adopted, the costs would have to be borne by some actors in the value chain. That is to say that if government supposes that statutory regulation is expensive, and hence industry should regulate, this only means that the administrative costs have been transferred to a different actor. Essentially an institution has to bear the cost that comes with the process. In the Ghanaian context where industry currently lacks the capability, government has to take responsibility for the process, particularly at the early stages of development.

8.5 Proposed Implementation of Enhanced Food Safety Assurance System

Given that the predominant strategic response of Ghana to food safety is 'reactive loyalty', the goal of the sector should be to graduate towards 'proactive loyalty' and 'voice' for the long term development and sustainability of the food manufacturing sector. However, the current priority should be to develop capability to adequately respond to the basic requirements presently governing the GFMVC, in the hope of enabling the system to grow and mature.

Because of the limitation of the selective strategic response to food safety in Ghana (see section 8.1) in terms of developing a reputation towards accessing the GFMVC, the study recommends that the proposed technical regulation, developed on the basis of HACCP, be ultimately applied holistically (i.e. across all sectors and enterprises, regardless of size and export orientation). Because of the inherently flexible nature of the HACCP-based technique, it would allow enterprises the opportunity to tailor the system to their needs without imposing disproportionate requirements.

Chapter 7 identified the factors influencing the compliance of enterprises. The findings clearly depict a lack of internal capability amongst enterprises as well as a lack of supporting environment to enhance compliance (including the lack of adequate capability of

regulators). There are a few issues relevant to culture though. It will therefore be unwise to suggest that a technical regulation based on HACCP (implies mandatory HACCP) be rolled-out immediately and across all sectors and enterprises. If implementation is to be effective in Ghana, there is the need to address the factors hindering the compliance of enterprises. This study recommends a four-phase approach to ease enterprises gradually and progressively into mandatory compliance with HACCP-based systems (see Figure 8-2).

The first phase (phase 1) sets the scene through increased awareness of all relevant stakeholders of the efficacy of HACCP-based approaches to protect public health and safety, enhance access to the GFMVC and establish the guiding principles for ensuring safe food. The second phase (phase 2) addresses upgrading of specific competences of relevant actors in the system. The third phase (phase 3) deals with ramping-up and the fourth phase (phase 4) deals with institutionalising HACCP-based approaches in Ghana.

Two key dimensions have been omitted in this food safety implementation plan for Ghana: time and costs. This is because it was difficult to obtain data on these two dimensions to inform the plan. In the case of the UK, it was calculated that 19 years had elapsed from the introduction of the Food Safety Act, 1990 until the time of the survey (when the compliance levels of enterprises was measured). Within this period, different initiatives have taken place concurrently, which have all worked together to reach the current state of food safety. At the same time, within this period, the process owners of these initiatives have changed, making the possibility of having compressive and accurate data more uncertain.

The author also believes that undertaking investigations into the time and cost elements of the implementation of integrated food safety systems is a significant project on its own which could not have been achieved in the time that was available to undertake this project.

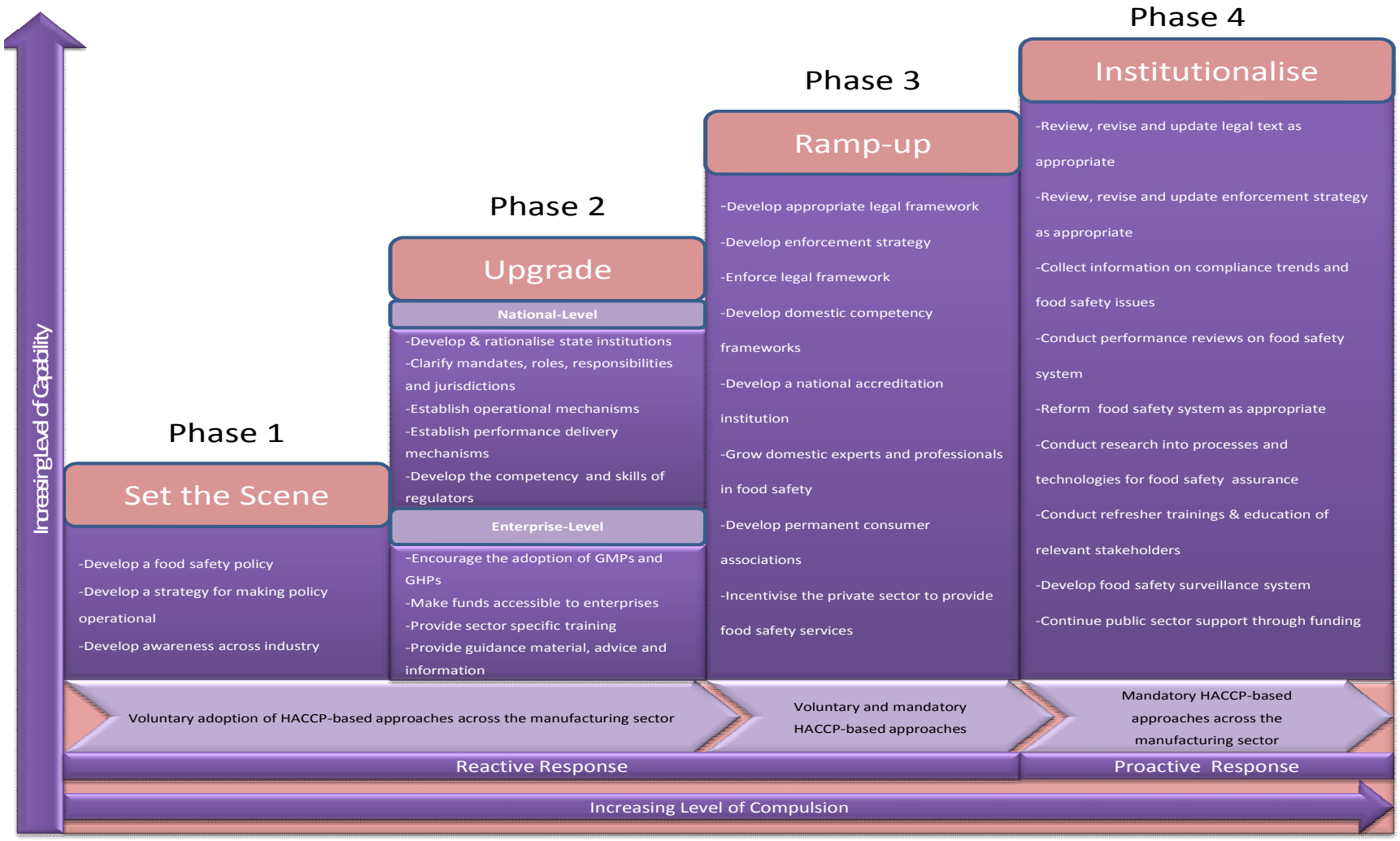


Figure 8-2: Food safety implementation plan in Ghana

8.5.1 Phase 1: Set the Scene

The study agrees with suggestions from the WHO and FAO that a national food safety policy is required to provide an overarching framework that facilitates the process of implementing integrated food safety management systems consistently across industry. The protection of public health and safety, including the implementation of integrated food safety systems in food enterprises is the responsibility of government (WHO/FAO, 2006). Accordingly, the responsibility for the development of a national food safety policy should be the role of government and its agencies. This is even so in the context of Ghana because of the lack of coherent industry representation. An effective food safety policy will set the strategic direction for food safety governance and define the framework for implementing specific strategies to achieve the overall goal of the food safety system. The policy will ultimately facilitate coherence of the food laws and regulations in operation, rationalisation of the mandates of regulators and the removal of duplications characterising the execution of regulatory functions (WHO, 1999; FAO/WHO, 2003; WHO/FAO, 2006). The resultant pressure of the duplication of regulatory functions on enterprises will also be removed. In the absence of a national food safety policy or an overall mechanism for coordination, a food safety strategy can provide the coherence needed to make effective the protection of public health and safety. From Table 8-3, the section on values, it is realised that both Ghana and the UK have no national food safety policy. However, the UK develops and implements a strategy for the protection of public health and safety. This strategy is continually reviewed and revised in accordance with the emergence of new risks, technologies, objectives and priorities of the food sector.

As was realised from the discussion on mechanisms for food safety assurance, all mechanisms, whether regulatory or non-regulatory, government-led or private sector-led, initiatives would require a certain degree of awareness and participation of all relevant stakeholders (consumers, food manufacturing enterprises, associations, regulators and even government). Awareness of food safety and HACCP forms the foundations of effective food safety management systems (Henson & Jaffee, 2006).

Without awareness any attempts at implementing more defined mechanisms is bound to be ineffective. Broad awareness and the recognition of the relevance and importance of integrated food safety techniques in enhancing access to the GFMVC, and more generally, achieving the developmental goals of the country is needed among all stakeholders (Henson & Jaffee, 2006; WHO/FAO, 2006). Relevant stakeholders need to understand what their individual roles are in food safety assurance. In particular, food manufacturing enterprises need to understand the benefits of HACC-based systems and why there is a need for a change from the dependence on performance-based approaches to integrated process-based approaches. Increased awareness is capable of addressing the culture-related gaps and the lack of knowledge and awareness gaps identified among manufacturers in Chapter seven (sections 7.7.3.1 and 7.7.3.8).

Consumers also need to be educated and provided with adequate and timely information. Even though the findings in this study suggest that consumers in Ghana have a limited role to play in effective food safety assurance, there is some evidence to suggest that there is potential for consumers to initiate change in manufacturer behaviour if they are adequately informed.

As the findings in section 7.7.3.1 suggested, a significant number of enterprises rely on state regulators for information and updates on requirements. Consequently, regulators also need to be adequately resourced to provide adequate information, advice and guidance to enterprises. Care must be taken to ensure that the content of the information, advice and awareness programmes delivered to industry is of high quality, and the channels for delivering them must be reliable. On a more general level, increased awareness will ensure that appropriate priorities are assigned at the enterprise-, industry- and national-level in terms of committing resources to food safety assurance (Henson and Jaffee, 2006).

8.5.2 Phase 2: Upgrade

Successful implementation of integrated process-based approaches requires certain antecedents to be in place. As suggested by the evaluation of policy alternatives to

address food safety system failures and enhance access to the GFMVC in Ghana, HACCP-based techniques are ultimately to be made mandatory. However, at this stage in the implementation process, the study recommends that food manufacturing enterprises be encouraged to adopt HACCP-based techniques, without making it mandatory because of the current capability gaps across industry and in the current institutional arrangements.

It was clear from the factors that influence compliance that there is a lack of a supportive environment to incentivise enterprises to comply with integrated food safety management approaches. The supporting environment is directly related to the effectiveness of the implementation of the integrated food safety initiative (WHO, 1999; WHO/FAO, 2006). Effective implementation, particularly in sectors dominated by SMEs as is the case in Ghana, requires government and its agencies to play a significant role, not just as regulators but also as agents providing the supporting environment to enhance compliance.

The effectiveness of the process of making operational the requirements of the legal text requires rationalisation of the institutions involved in food safety assurance, and equipping them with adequate skills and competences to enforce requirements as well as provide advice and guidance to industry. There are currently two primary institutions enforcing food law and regulations relevant to food manufacturing in Ghana: the Ghana Standards Board (GSB) and the Food and Drugs Board (FDB). There is the need to reform the mandates and clarify the roles and responsibilities, as well as jurisdictions for these institutions. The responsibility for the enforcement of food law and regulations on the domestic market should continue to be with the FDB. The GSB currently has capacity to govern export-oriented enterprises. This responsibility should be maintained. The current regulations that provide these two institutions with their mandates require coordination and cooperation between them with regards to the development of standards for food. Clear operational mechanisms should be established to lay down cooperation and coordination requirements/arrangements between the two agencies, in terms of operational aspects of developing and enforcing food law and regulations. This should go beyond the current arrangement where an

executive from one agency sits on the board of the other agency. Clarifying the mandates functions and jurisdiction of regulators will lay down a standard against which to hold regulators formally accountable.

Since both agencies currently have some accredited laboratories for food analysis, a certificate of analysis(CoA) issued by one agency should be recognised by the other agency (and even the other supporting government agencies such as the Food Research Institute (FRI) with capability for food analysis) within the period in which it is valid. The practice of universal recognition of a CoA, regardless of which regulator issued it has the potential to ease the financial burden of double certifications on enterprises. This means that standards, procedures and test contents need to be discussed and agreed before hand, standardised and made easily accessible to relevant stakeholders. Well agreed and established as well as communicated operational procedures would increase transparency as well as accountability in the regulatory operations and impact positively on the reputation of regulators.

The current mandate for the FDB makes provision for the appointment of public analysts in all districts. This is an important provision, considering that the primary national testing facilities for food control are housed in Accra, the national capital. The current practice of enterprises taking samples on their own and travelling over long distances to have them analysed means that enterprises may decide to prepare a sample specifically for analysis, towards the acquisition of a certificate. Furthermore, because enterprises lack the technical ability to decide on appropriate sampling techniques samples taken could be compromised, and this has the potential to negatively impact on the results of the analysis. The appointment of public analysts in all districts, which are actually in close proximity with enterprises, means that they will be able to go and sample products on the manufacturing line on the behalf of government regulators and conduct analysis on them. This would improve the quality of samples tested and would reflect the true state of products manufactured for sale, even in the domestic market. Decentralising the analysis of samples of food will also facilitate the elimination of the practice of enterprises carrying samples they have

collected for analysis by national laboratories and the relatively longer waiting times for enterprises to get results for their products from regulators.

Successful implementation of this strategy means that proper coordination and explicit requirements with regards to who qualifies to be a public analyst, as well as operational procedures and standards are established. At the same time, delivery performance requirements are needed.

Currently, the Customs Excise and Preventive Service (CEPS) plays a significant role in the enforcement of food law at the ports of exit and entry. The Ghana Export Promotion Council (GEPC) also plays a significant role in ensuring that enterprises are aware of requirements of the international market as highlighted in section 7.5.8.3. Some level of coordination arrangement exists between the GSB and these two institutions. However, the coordination arrangement, in particular, between the CEPS and GSB is not working effectively; to the point that manufactured exports are able to leave Ghana without approval from the GSB. It is essential that proper mechanisms for coordination and cooperation be established between these institutions to prevent the export of potentially unsafe manufactured food, which has the ability to damage the reputation of Ghana on the international market.

Most enterprises lack the technical competence to understand the implications of HACCP-based approaches for their business and more specifically, how to implement the requirements of integrated food safety management systems. Accordingly, guidance documents, implementation manuals and sector specific tools will be required in an easy to understand language is recommended in line with suggestions from respondents. This presupposes that regulators also need to be up to scratch with integrated approaches and its requirements for successful implementation. Competence development or upgrade needs to be done at the national level because integrated HACCP-based approach is a specialised area and hence specialised training is required to introduce it to industry. Professionals and experts are required in the area of Food Science and Technology, Chemistry, Biological Sciences, *inter alia*, and these professionals should receive additional training to ensure that they have the competences specific to integrated process-based approaches to food safety.

Regulators also need to be educated to change their mindsets from the use of performance-based approaches to integrated process-based approaches. Inspectors and auditors need to be educated and trained to ensure that they can consistently provide accurate information and advice to enterprises, as well as assess enterprises with the intent to ascertain compliance levels with the requirements of regulations. Knowledge of prerequisite programmes to HACCP implementation is also needed, as without the practice of these prerequisites, HACCP will not be successful. The prerequisite programmes mainly concern the application of good hygiene practices (GHP) and good manufacturing practices (GMP) (Henson and Jaffee, 2006). The significant number of SMEs undertaking manufacturing requires that more field workers be trained to match up to regulatory capacity.

A major underlying theme featuring prominently in the factors influencing the compliance of enterprises with integrated approaches is the lack of access to affordable credit. A major concern of a regulator was that even if funds are made available to enterprises, the funds will not be used effectively. Because of this, the study recommends that financial support be provided directly towards capability development at the enterprise level. This may be appropriated through rewarding desirable manufacturer behaviour. That is if manufacturers decide to implement integrated approaches based on HACCP, they could be provided with subsidies towards training their workforce and the cost of laboratory services for verifying and validating food safety management systems. Tax incentives are also a good way of giving back money to enterprises to facilitate food safety management system implementation (BRE, 2003).

Incentives for the implementation of HACCP-based approaches have been provided through public funds in many countries: e.g. Chile, Thailand, and Brazil (WHO/FAO, 2006). Even in Ghana a pilot programme was undertaken in 2008 which sought to provide funding for the full implementation of ISO 22000 international food safety management system, which has HACCP as an integral part. This project was funded by an international development cooperation partner and coordinated by the GSB. One of the enterprises used as a case study also claimed to have received 50% funding from

an international development cooperation partner of Ghana to implement HACCP. If these programmes could be rolled out holistically, a lot more enterprises would be motivated to take up the implementation of HACCP-based approaches and its related prerequisite programmes. This will in turn enhance compliance with food safety requirements in Ghana and enhance the country's reputation on the international market, towards an enhanced access to the GFMVC.

Training at the enterprise level is essential for the long term success of HACCP-based systems. Because of the lack of a practice element at the first stage where the foundation for HACCP-based approaches is developed, there is the need for further education and training for enterprises relevant to designing and making operational the requirements on the shop floor. On the basis of the data collected, different levels of knowledge are required by the different worker groups (shop floor staff, supervisors, managers and top-level management) in an enterprise. At the basic level, the workforce are required to understand the importance of keeping food safe, how their actions might introduce hazards into food, basic personal hygiene, recording procedures, housekeeping, *inter alia*. The intermediate and more advanced levels of education and training targets the development of specific competencies that facilitates the development, evaluation and continuous improvement of the food safety system. This level of training is usually given to employees who may form part of a food safety team, and involves an understanding of the requirements (legal as well, if mandatory) and the preliminary processes.

One concern raised by respondents was that the training provided by regulators is too generic. Manufacturers, especially SMEs, need training that is relevant to their needs. It is possible to use other specialised training providers apart from government regulators to deliver formal training. Other training initiatives could involve sponsoring experts to go and provide in-house training for manufacturers. This initiative could be very expensive, but has the potential to deliver effectively (WHO/FAO, 2006).

An initiative that is currently underway in Ghana (taking place between April and September, 2011), sponsored by the European Commission but delivered by the International Trade Centre (ITC), seeks to harness private sector professionals and train

them on theoretical as well as practice elements of food safety management. Upon successful completion of the training, these professionals will be used as trainers cum counsellors, working under the supervision of international consultants to implement food safety management systems for enterprises. This initiative is also effective in terms of guiding enterprises through the actual implementation process and helping their workforce upgrade their competencies to both run and maintain the food safety management system.

Enterprises will continue to need timely information and advice on effective food safety management based on HACCP to address the culture related elements of the barriers to implementation.

8.5.3 Phase 3: Ramp-up

HACCP is a legal requirement in Europe, America and a number of other international countries. As was established in Chapters 3 and 6, HACCP is the foundation of most of the international standards used as 'tickets' for accessing the GFMVC. Accordingly, enterprises desiring to trade with these international countries are required to have HACCP certificates in addition to demonstrating through 2nd party audits compliance with the requirements of prerequisite programmes.

At this stage of the implementation process the study recommends that HACCP be made mandatory for all exporters, prioritising the sectors where HACCP implementation is immediately important, and voluntary for enterprises serving the domestic market. This is to ensure that export-oriented enterprises meet the requirements of importing countries while enterprises serving the domestic market continue to develop capability to comply fully with HACCP-based approaches. The decision to acquire certification for HACCP-based systems should be the prerogative of manufacturers, based on the requirements of their customers.

The above initiative means that an appropriate legal framework needs to be in place, and this must be designed in such a way that it does not infringe on the ability of manufacturers, in particular SMEs, to be flexible. It is also suggested that the legal framework considers the recommendations outlined in section 8.4.5. This phase

should be dedicated to developing systems that will ensure that when HACCP-based approaches are made mandatory and rolled-out across industry, it will be relatively easy to uphold the practice. This means that instead of having in place one-off initiatives, systems will be developed that will facilitate the effective working of the food safety system.

Effective regulation of HACCP-based approaches means that requirements of the law are appropriately enforced. Effective enforcements have the potential to remedy regulatory mechanisms with defects. Similarly, poorly designed enforcements can undermine the most sophisticated designs of regulations (Baldwin and Cave, 1999). Enforcements comprise seeking to gain compliance with the law, by resorting to formal enforcements and prosecutions, as well as using a variety of other techniques-education, advice, persuasion and negotiation. A number of enforcement strategies exist: compliance approaches and deterrence approaches.

Figure 8-3: Hierarchy of enforcement strategies

(Baldwin and Cave, 1999)

Compliance enforcement strategies emphasise the use of measures falling short of prosecution to seek compliance with requirements. Deterrence strategies employ punitive measures, in particular, making use of prosecutions to deter potential non-compliance. Two sub-strategies (Figure 8-3) within the compliance strategy have been developed as persuasive and the insistent strategies. Both aim to secure compliance

but the former approach is more accommodating. Regulators educate and encourage offenders into compliance with the law. The insistent strategy is less flexible and has defined limits to the tolerance of enterprises coming into compliance within a limited period (Baldwin and Cave, 1999).

Different groups of enterprises were found in Ghana in relation to compliance with food safety requirements in general. There were those who were not complying because they lacked the technical competence and resources to do so.

There were suggestions that some enterprises intentionally render food injurious to consumers through actions that increase the content and volume of the food product, and there were those who lacked awareness. These groups of enterprises will require different approaches to ensure compliance. As a consequence, the study recommends that a hybrid of the two compliance strategies be used in Ghana, and deterrence strategies be adopted only when all efforts to secure compliance have proved futile. This means that enforcement officers must be skilled to use their discretion to apply rules selectively so as to address problems of compliance that arise, taking into consideration the details of the case and potential risk to public health and safety.

The requirements of the international market have implications for institutional development in the Ghanaian context. The need to demonstrate compliance of enterprises through recognised training and certification frameworks means that there is the need for such frameworks and institutions in Ghana to ensure meeting this objective cost-effectively. International retailers currently require proof that food handlers have training commensurate and appropriate for their jobs. Therefore, for the purposes of accessing the GFMVC, it would have to be demonstrated that the training delivered to enterprises is equivalent to the training recognised by the international market as appropriate for ensuring safe food. The training will also have to be delivered by recognised training providers. In other words, the training provider will have to be accredited if qualifications issued by the provider are to be recognised by retailers abroad.

Currently, there are no frameworks to guide competency development apart from the main stream framework for generic education, which is not directly linked to the needs

of industry. Therefore, there is the need for recognised national qualification frameworks and standards that are at least equivalent to recognised frameworks internationally. There is the need to strategically link the goals of economic development to industry needs and education so that frameworks are fit for purpose. Procedures will also have to be established to ensure that service providers deliver quality service towards meeting the overall goal of safe food for all.

Furthermore certification and accreditation services are provided by institutions from Europe and South Africa. These institutions undertake such services directly for enterprises or on behalf of international retailers. The costs of these services are expensive because of international travel and accommodation expenses of experts from these institutions coming to work in Ghana. The costs are passed on to enterprises. In order to ensure that enterprises comply with requirements of the GFMVC and operate competitively, such credible and reputable institutions need to be established in Ghana, either by public funds or through incentives for the private sector to get involved. Furthermore, experts and consultants that provide services for food safety management will have to be home-grown because of the cost implications of using international professionals, and the exponential costs that will be incurred due to the number of such professionals that will be required to positively affect the whole industry.

There is also the need to ensure that consumer needs, interests, and voice are continually incorporated into decision-making processes that ultimately impact on their wellbeing. Consumer awareness will have to be a continual process, and to adequately reach consumers will require consumer associations to be integrated into the food safety system as opposed to the current ad hoc consumer representation structure.

In some countries (e.g. in the UK) institutions are set up by government to take over relevant aspects of food safety assurance (e.g. training and consumer representation). Support in terms of public funding is provided up until a stage where the relevant institution is able to stand independent of government. This model could be applied in

Ghana to ensure that consumer needs are adequately catered for in the regulatory process.

8.5.4 Phase 4: Institutionalise

The whole objective of implementing HACCP-based approaches is to enhance the prospects of access to the GFMVC. There is evidence to suggest that the use of HACCP-based techniques has the potential to facilitate meeting this goal. In order to reap benefits across the whole food manufacturing sector, a holistic implementation is recommended. This is the stage in the implementation process where HACCP-based approaches are made mandatory across the sector, as opposed to the current selective approach adopted.

Piloting the legal framework and the enforcement strategies at the ramp-up phase will provide regulators with insight regarding the effectiveness of the food safety control system. This knowledge is to be used to review, revise and update strategies in operation, pending the roll-out phase.

In order to maximise the resources available to regulators, it is imperative that data on the trend of compliance be collected by regulators to support enterprise profiling. The profiles developed can then be used to design effective enforcement strategies that will utilise the resources of regulators where they are needed the most.

The effectiveness of a mandatory food safety management system based on HACCP will depend largely on the ability of enterprises to access all the facilities required to effectively comply. The study thus recommends the following:

- Decentralising information sources.
- Decentralising training.
- Decentralising enforcements.

A nationwide surveillance system is also needed both to monitor national trends in food safety and to provide a source of information to inform reforms in food safety regulation and enforcement strategies.

After implementing a mandatory HACCP approach in the Ghanaian manufacturing sector, performance reviews are necessary to ensure that the system is running

satisfactorily. If performance is satisfactory, the practice needs to be fully integrated into industry. This will require education and training to continually refresh the level of awareness created in industry. Government commitment in terms of continued public funding for the execution of regulatory functions is also essential.

With the reactive capacity in place, Ghana would need to learn to be more proactive with regards to increasing participation in international activities relevant to the development of international standards for food. This way, representatives of Ghana on the international front will have a first-hand knowledge and understanding of requirements and their implementation. There is therefore the need to conduct more research with the intent to both understand the technical aspects of food and develop processes and technologies to support and grow the food safety system. This will make it easier to forecast trends in international standards and take action before requirements become mechanisms for governing the GFMVC. This will also ensure that Ghana can actively participate in international negotiations with an impact on international trade that could affect its manufacturing sector.

The author believes that with these mechanisms, structures and increased awareness of relevant stakeholders in food safety, there is great potential for an enhanced access to the GFMVC for Ghanaian food manufacturers.

8.6 Chapter Summary

It has been re-iterated that compliance with the requirements of food safety is a prerequisite for accessing the GFMVC. The prospect of access requires capability in food safety assurance at both the national as well as the enterprise level.

Lessons have been learnt from the UK food and drinks sector which may be useful for reforming the Ghanaian food manufacturing sector, when properly tailored to its needs. In particular, it is gleaned from the UK case that a holistic, well structured, transparent, accountable and well documented food safety system based on HACCP with an adequate supportive environment drives the compliance of enterprises. Based on these lessons, several strategies have been proposed to address the gaps in the Ghanaian food manufacturing sector. The author strongly believes that a technical

regulation based on HACCP will provide the impetus for compliance amongst enterprises. This coupled with the right institutional arrangement (effective organisational structure, established processes and mechanisms for operations and values to guide the system) and support for enterprises would enhance Ghanaian food manufacturing sector's prospects of access to the GFMVC.

CHAPTER 9: SUMMARY AND CONCLUSIONS

This chapter revisits the aim and objectives of this study and summarises the research methodology and findings. The author also presents the contributions of the research to knowledge and the implications of the findings for practice.

Conclusions about the research proposition in Chapter 1 are also drawn. The chapter concludes by outlining the principal limitations of the study and opportunities for future research. Overall, this chapter demonstrates what the research sought to achieve, what it has achieved and its implications for relevant stakeholders.

9.1 Revisiting the Research Aim and Methodology

The aim of the research as stated in section 1.7 was to understand the practice of developing food safety capability to enhance access to the global food manufacturing value chain (GFMVC), using high value-added products. This research was thought to be significant because of the challenges developing countries were encountering in their quest to access the GFMVC using manufactured food products. Developed countries were more successful at this practice and hence there was a need to learn from them. The literature reviewed suggested that a key requirement to qualify for access to the GFMVC was compliance with food safety requirements. Therefore this study focused principally on how countries and their food manufacturing enterprises comply with the basic requirements of food safety.

The aim has therefore been achieved primarily using a case study methodology to investigate the food manufacturing sectors of two countries: Ghana (a developing country in Africa) and the UK (a developed country). These two countries represent food manufacturing sectors that are at different stages in their quest to comply with the requirements that govern the GFMVC, protect public health and safety, as well as enhance their access to the GFMVC. The practice of developing food safety capability to enhance access to the GFMVC is not new. However, there is some level of uniqueness introduced in how individual countries approach the practice because of the differences in economic goals and aspirations, policy priorities and factors within

domestic contexts. Therefore the intent of this study using a developed country as a benchmark for a developing country was not to replicate the process of compliance within the developed country in the developing country, but to learn lessons which could be tailored to the needs of the developing country.

Four research objectives provided the underlying structure for executing the research and presenting the findings in this thesis. These were:

1. To review relevant literature to understand the governance and controls executed in global value chains and their implications for developing countries accessing the global food manufacturing value chain (GFMVC);
2. Examine the specific experience of the UK, in the context of the current regulatory, institutional and policy frameworks and how that has impacted on the status of food safety;
3. Investigate the current state of the food safety assurance process in the Ghanaian food manufacturing sector, within the current regulatory, institutional, and policy framework, in terms of its capability to assure safe food;
4. Evaluate an appropriate regulatory, institutional and policy framework with the potential to enhance food safety assurance in Ghana.

9.1.1 Summary of Findings: Achieving Research Objectives

Research Objective 1: *Review relevant literature to understand the governance and controls executed in global value chains and their implications for developing countries accessing the global food manufacturing value chain (GFMVC).*

The literature review on the governance of global value chains (GVCs) revealed three models of governance with implications for developing countries:

- Governance as driving;
- Governance as coordination;
- Governance as normalisation.

Governance as driving was depicted as interactions characterising supplier-buyer relationships in which one actor principally drives actions within the chain. Lead

enterprises were identified to be the main drivers. These lead enterprises were said to take over high-value added functions such as research, design, and organise manufacturing through networks of independent suppliers, the majority of which are in developing countries.

The governance as coordination perspective is presented in terms of inter-enterprise relationships and institutional mechanisms through which coordination of activities which are non-market are achieved in value chains. This representation of governance leads to four governance architectures: modular, relational, captive and hierarchical. Lead enterprises still play a significant role in the coordination of transactions achieved in such chains.

The third perspective of governance accepts some of the dimensions of the two perspectives already discussed, however the perspective argues that in practice, governance also includes the influence of social norms on how manufacturing operations are organised. Governance as normalisation also attempts to account for the external institutional and regulatory frameworks within which even lead enterprises operate.

In an attempt to define the concept of governance to incorporate all the elements highlighted in the three conceptualisations of governance, the literature recognised that it was difficult, if not impossible. Depicting governance as the dynamics based on inter-linkages between trade rules and quality conventions at one end and the internal processes specific to value chains on the other end poses a major challenge. Ponte and Gibbon (2005) therefore suggested that it may be more useful to attempt to fine-tune the concept by adding underlying components to its description and making predictions about the future based on historical dynamics.

A more comprehensive framework of governance in GVCs was provided by Messner (2002) in the form of the World Economic Triangle (WET), which provides essential elements to consider in understanding how the global economy is governed. The WET positions a network of local enterprises (also known as clusters) in the global economy, linking them to intergovernmental global governance structures, private and public-private governance structures in GVCs. The WET model also highlighted the

mechanisms of governance (rules of the game) and the scope of opportunities available to local networks in terms of accessing the global economy.

Extending these generic structures into how the GFMVC is governed revealed that compliance with food safety requirements has become the basic minimum requirement for qualifying countries and their food manufacturing enterprises for orders before competitive factors are considered to ultimately decide on who actually participates in the chain. It was discovered that multilateral, regional, and bilateral agreements relevant to food safety provide the legal ground rules upon which international trade in food is organised. These agreements provide a framework as well as influence the mechanisms employed in countries to address food safety system failures. Relevant countries within those geographical locations and countries that desire to trade with the countries bounded by the 'rules of the game' are required to comply with the requirements or are marginalised.

Retailers which are the core actors in the GFMVC make operational the requirements governing the food value chain, making the ultimate decisions on how to organise manufacturing networks and who should be integrated or marginalised.

In summary, it was gathered that the opportunities available to developing countries and the hindrances faced in their attempt to access the global food economy is influenced by the inter-governmental governance mechanisms that exist at the global, regional and bilateral level and governance patterns specific to GVCs. However, the capability of domestic enterprises and the countries in which they are hosted to consistently produce safe food and do so competitively have significant implications for qualifying for orders and ultimately participating in the GFMVC.

Both the theoretical and practice literature on food safety governance suggested essential elements that form the capability framework at the national level for complying with the requirements of the GFMVC such as:

- Food laws and regulations;
- Organisational arrangements with appropriate mandates and mechanisms for coordination, operation and operational delivery performance;
- Values; and

- Resources to execute regulatory functions.

These elements formed the conceptual framework that provided the basis for exploring the manufacturing sectors of the two countries of interest. The enterprise-level capability and response to national mechanisms were incorporated in the exploration as essential elements for understanding the feasibility of national mechanisms to assure safe food.

A summary of the findings from the two country's case studies are presented in response to how objectives 2 and 3 were achieved.

Research Objective 2: *Examine the specific experience of the UK, in the context of the current regulatory, institutional and policy frameworks and how that has impacted on the status of food safety.*

This phase of the research used exploratory and descriptive multiple case studies, relying on archival documents, survey-based questionnaires and interviews as methods for data collection. In the UK, a total of 112 food manufacturing enterprises were surveyed, six food manufacturing enterprises were selected as case studies, and six regulators and representatives of sector associations were interviewed at various stages in the research. The respondents gave their perceptions regarding the phenomenon of accessing the GFMVC based on their geographical as well as functional positions in the food value chain. The data was then pieced together to provide insight into how the UK assures food safety.

The dominant strategic response of the UK to food safety was identified to be 'proactive' and 'reactive loyalty'. The system has an inherent capability that allows it to anticipate risks and trends in food safety issues, and implement mechanisms ahead of their coming into being, and at the same time, national mechanisms are tailored to respond to the obligations of the UK as a result of their affiliations with global and regional governance structures.

The mechanisms employed in the UK reflect national shared values that are intolerant of risk and uncertainty. A regulatory system for food safety has therefore been

implemented that is based on independent scientific risk-based assessments and advice. The system is flexible, yet highly structured, documented and published.

The government has defined the basic minimum level of food safety acceptable with a mechanism that incorporates process, product and competency requirements. The requirements of the legal text are enforced by an integrated agency organisational arrangement, with an independent regulator, which has the responsibility for oversight and food policy. Local authorities play a significant role in the enforcement of food law and regulations, and mandates, roles and responsibilities as well as jurisdictions are clarified and published. This provides a basis for making optimal use of resources made available for the execution of regulatory functions. At the same time, clear lines for formal accountability are established.

The independent regulator operates an open and participatory system. As a result, information on regulatory operations is published as well as easily accessible to relevant stakeholders (including the international community). Stakeholders are invited to participate in the regulatory process and their views are taken into consideration in the governance of the food safety system. One can therefore say that the system is transparent and informally accountable. Up-to-date, timely and relevant information is also communicated to relevant stakeholders. Government interference in the operations of regulators is minimal even though government funds the full budget of regulators.

This basic minimum requirement set by government has been incorporated into private regulations, as the fundamentals of current governance mechanisms with implications for access to retailers. However, the bar for the basic minimum requirement for food safety has been raised by retailers to protect brand image and uphold consumer confidence in the food system.

At the same time, industry and government are working hand-in-hand to provide the supportive environment to facilitate the compliance of enterprises. There is an abundance of institutions providing food safety services: accreditation, certification, training and laboratory services. Some of these services, in particular, training are funded for SMEs through indirect government funds as part of strategic efforts to

foster the growth of specific sectors. Government agencies partner with the private sector service providers to develop capability at the enterprise level.

In response, enterprises have implemented integrated food safety management systems based on HACCP to proactively deal with the risks associated with food safety. The outcome of this is a 99% compliance level amongst food manufacturing enterprises, increased traceability in the domestic food value chain, increased confidence of civil society in measures employed, and more generally, increased protection of public health and safety. This has enhanced the reputation and commitment of the UK food and drinks sector with regards to compliance with food safety and hence an enhanced access to the GFMVC.

Research Objective 3: *Investigate the current state of the food safety assurance process in the Ghanaian food manufacturing sector, within the current regulatory, institutional, and policy framework, in terms of its capability to assure safe food.*

The case study for the Ghanaian food manufacturing sector made use of techniques for data collection similar to those used in the UK. Thirty five (35) food manufacturing enterprises were used as case studies to validate the research problem. Out of the 35, nine were selected for detailed investigations. Eighteen other respondents were selected from retailers, raw material suppliers and regulators to get a relatively balanced view of the issues that were relevant to food safety assurance in Ghana.

The strategic response of the Ghanaian food manufacturing sector to food safety is predominantly 'reactive loyalty'. The study discovered that mechanisms, reforms and upgrades are in response to market and international demands. At the same time, a selective approach is adopted based on the areas of comparative advantage.

Even though a technical regulation exists across the whole domestic food value chain, in accordance with the selective approach, specific arrangements are implemented in addition to the basic technical regulation for selected sectors. Consequently, enforcements are more stringent in some sectors than others and this sends wrong signals to manufacturers regarding the consistency and fairness of regulatory operations.

The legal text which provides the basis for acceptable and unacceptable behaviour in the food sector is not comprehensive enough to comply with the basic requirements of food safety in the GFMVC. Essential elements regarding traceability and product recalls are missing. Furthermore, the basic law makes no reference to international best practices in food laws and regulations that incorporate requirements into the manufacturing process.

The enforcement of food law is achieved using a multiple-agency organisational arrangement. The study, however, discovered that clear lines for oversight and coordination of institutions involved in food safety assurance are not established in the mandates of regulators. This has resulted in confusion and duplication of roles and responsibilities, and confusion over jurisdictions. Therefore the resources of regulators are not put to optimal use. The implications of this overlap in regulatory roles and functions manifest in double certifications for enterprises, with already limited resources for compliance.

There was clear evidence of a lack of established and published operational procedures as well as mechanisms for measuring the performance of regulatory operations. This gap in the mandates of regulators, the lack of mechanisms for ensuring consistency and lack of established procedures to ensure that regulatory objectives are met means that adequate lines for accountability are not established, a sign that transparency is also limited. There was also evidence of a lack of consumer involvement and representation in the regulatory process and government regulators alluded to government interference in the operations of regulators.

The lack of a well-structured, documented and published system, coupled with the lack of national and enterprise capability across industry has resulted in a negative response to compliance amongst food manufacturers. These gaps in food safety assurance demonstrates to the international community the lack of capability of the Ghanaian food manufacturing sector to consistently produce high quality safe food. The prospects of the sector enhancing its access to the global food manufacturing value chain with high value-added products will continue to remain uncertain if these gaps are not addressed.

Research Objective 4: *Evaluate an appropriate regulatory, institutional and policy framework with the potential to enhance food safety assurance in Ghana.*

This phase of the study drew on the literature and findings from case studies to discuss how food safety is assured in the GFMVC, with the intent to draw on lessons and insight to make recommendations for Ghana.

The cross-case analysis revealed that both country case studies have common objectives with regards to food safety regulation: to ensure consumer safety, prevent fraud and ensure economic development. However, different models of food law and regulations, organisational arrangement and values guide the two systems.

Accordingly, the responses of food manufacturers to requirements implemented are different, with one (the UK) achieving 99% compliance and the other (Ghana), 40% compliance. This translates into different levels of reputation and credibility with regards to the commitment of both country's case studies to food safety, with implications for whether or not countries qualify for orders and ultimately win orders in the global market.

The outcome of the cross-case analysis demonstrated gaps in the Ghanaian food safety assurance process which need to be addressed to raise the country's profile on the international market.

As highlighted in chapters 3, 6 and 7, a number of mechanisms could have been proposed to address the gaps in the policy framework in Ghana. Because of the lack of adequate quantitative data to conduct a regulatory impact analysis (policy impact analysis in this case) a hybrid methodology was adopted to address this objective. The methodology is known as Analytical Hierarchy Process (Saaty, 2006). Qualitative variables identified from literature were transformed into quantitative data based on the understanding and insight the author gained with regards to food safety assurance in the GFMVC.

This phase of the study evaluated six policy alternatives, with HACCP as a foundation:

- Statutory regulations.
- Co-regulation.

- Self-regulation.
- Incentives/market-based mechanism.
- Information and education.
- No intervention.

The outcome of this evaluation suggested a statutory regulation based on HACCP as the most appropriate policy framework to address food safety system failures in Ghana and enhance access to the GFMVC. Because of the current lack of capability at both the national and enterprise level, a phased implementation of the proposed food safety policy was recommended to gradually ease the sector into mandatory compliance with HACCP-based approaches to food safety.

It was also recommended that the current multiple organisational arrangements be maintained, however mandates should be reformed to ensure that regulatory functions and jurisdictions are clarified, and values that enhance the reputation and credibility of regulators such as transparency, accountability and independence be fostered, in addition to providing incentives to enhance the compliance of enterprises.

9.1.2 Contribution to Knowledge

Research investigating the governance of global value chains (GVCs), the prospects of access of developing countries to GVCs, and the development of food safety capability have often used a commodity chain approach (e.g. coffee and poultry) to address relevant issues. Accordingly, there is a lack of research addressing food safety assurance at an aggregated level (i.e. using a top-down country case study), and in particular, investigating how food safety is assured in the two country case studies (the Ghanaian food manufacturing sector and the UK food and drinks sector), within the wider context of the global food manufacturing value chain (GFMVC). Therefore, this study has used value chain analysis at an aggregated level to contribute to an enhanced knowledge and understanding of how countries and their food manufacturing enterprises might develop food safety capability to respond adequately to the basic requirements of the international market, and at the same time, enhance

their prospect of access to the GFMVC. The two country case studies provide evidence to suggest that the development of food safety capability at the national and enterprise level in response to the basic requirements of the international market is a pre-requisite for access, and the effective implementation of a food safety technical regulation in countries drives compliance among enterprises.

Furthermore, at different phases of this study, specific elements contribute to existing knowledge on different issues relevant to food safety assurance:

- The impact of implementing an integrated food safety management system in various countries and sectors was investigated in the past without giving due consideration to the factors that aid successful implementation. Using the few variables alluded to in the literature on food safety and the requirements of the ISO 22000 international food safety standard for food manufacturers, this study has utilised factor analysis to identify four factors that are necessary for successful implementation of integrated food safety management systems (see section 6.7.9).
- The knowledge of the process of making operational integrated food safety management systems on the shop floor is lacking, as often, the operationalisation process is internalised in enterprises through the use of a consultant. This study has therefore developed a model for making operational the requirements of food safety on the shop floor that could act as a guide to enterprises that desire to implement integrated food safety management systems.
- The study has identified criteria (see sections 3.3.2 to 3.3.2.4) from other disciplines (environmental management and regulatory governance) and validated them in the context of food safety assurance (see figure 8.1) that could be used to evaluate policy alternatives for food safety assurance in the absence of quantitative data in RIA.
- Conventional approaches to food safety policy evaluation utilise quantitative cost-benefit analysis, leading to the selection of an approach with a benefit of surplus to address policy problems. However, this study has demonstrated the

potential of utilising the Analytical Hierarchy Process (AHP), an existing technique, for selecting from alternatives, in a novel way, to evaluate policy in the context of food safety, to effectively yield a desirable policy alternative.

9.1.3 Implications of Findings for Practice

The findings of this study suggest that without compliance with the basic minimum food safety requirements of the GFMVC, countries and their food manufacturing enterprises may not qualify for access. In order to understand how food safety assurance helps to enhance access to the GFMVC, policy makers need to understand the various elements of food safety capability and the interplay among each other to gain insight into what strategies are available, their effects on compliance and how these strategies can be tailored to suit the particular needs of their country. This study has provided insight into how the different elements work together to raise the profiles of countries and their food manufacturing enterprises on the international market with regards to food safety.

The study has demonstrated that a legal framework is required to enhance the compliance of enterprises with the basic requirements of food safety, and this framework must have as one of its principal objectives the protection of public health and safety. This presupposes that government has a significant role to play, as the enactment of a legal framework is the prerogative of government. This legal framework will act both as a guide to compliance and a motivator for relevant stakeholders without putting unnecessary burden on the regulated. At the same time, the legal framework will guarantee a certain level of consumer safety. The study also suggests that an appropriate organisational arrangement is necessary to enforce the legal framework. Regardless of the model of organisational arrangement adopted, it is essential first and foremost that the role of government be clarified, as the agent providing the impetus and resources for the effective working of the system and not as a direct actor interfering in the operations of regulators (unless the regulator is a government department). This will eliminate political influences, ensure continuity in the policy development processes and longer-term planning for regulators and the

international community. Regulators of food safety need government funding to focus their energies on ensuring consumer safety as opposed to the self-financing models suggested by the utilities sectors.

A supportive environment, in terms of making the facilities (e.g. laboratory and training infrastructure) that support the compliance of enterprises available will enhance compliance.

For food manufacturers this study suggests a shift from the dependence on performance standards for assurance food safety to the use of integrated process-based approaches. This will require that food safety be considered in all decision making relevant to food production: e.g. equipment, factory layout, training, storage.

On a more general level, all relevant stakeholders need adequate, timely information to ensure that the food safety system works effectively.

9.1.4 Conclusions about the Research Proposition

The study began with the research propositions that

'an enforced technical regulation drives compliance with food safety requirements (and by extension enhances access to the GFMVC); however, it is not a sufficient motivator, particularly in sectors dominated by small and medium enterprises (SMEs), and hence should be supplemented with other incentives that facilitate capability development at the enterprise level.'

The author believes that this research proposition has been confirmed because it is clearly demonstrated in the Ghanaian food manufacturing sector that even though a technical regulation currently exists, the lack of proper enforcements and supportive environment has resulted in the lack of compliance of food manufacturing enterprises in Ghana. The UK case demonstrates the opposite: the technical regulation is properly enforced and the government and the private sector work together to provide a supportive environment to incentivise enterprises to comply. Even though some of the evidences collected point towards the fact that self-regulatory approaches, in principle, have the capability to drive the compliance of enterprises with food safety requirements, critical analysis of the evidence suggests that in practice the approach

will not be effective without an element of compulsion. This goes to show that an element of compulsion is necessary to incentivise enterprises to comply with food safety requirements.

9.2 Limitations of the Research

This research has investigated how countries and their food manufacturing enterprises comply with food safety requirements, towards an enhanced access to the global food manufacturing value chain. The generalisability of the findings from both the UK and the Ghana survey could not be claimed because the outcomes were not statistically significant. However, the surveys provided useful insight into the practices adopted to comply with food safety requirements at the enterprise level in the UK, and in the case of Ghana, the data helped to establish the phenomenon of non-compliance amongst food manufacturers, in addition to indentifying specific areas with gaps. Particularly in the case of the UK, it was difficult to establish with the sample size used that size of enterprises has an effect on drivers, benefits and challenges to food safety management system implementation. This was contrary to findings from literature, which clearly links size to limited resources, and indirectly suggests that size affects the drivers, benefits and challenges to compliance with food safety requirements.

Furthermore, the recommendations made in this study are specific to Ghana, and are in response to the specific gaps identified from the data. However, if similar dynamics and factors characterise other contexts, the recommendations could be applicable.

9.3 Opportunities for Further Research

As highlighted in section 8.5 the implementation plan is lacking with regards to cost and time elements to achieve the initiatives recommended. The author realises that these areas are relevant to fully understand food safety assurance. As a result, it is recommended that the time and cost elements be an area for further research.

Secondly, this study did not seek to investigate the potential response of consumers to an enhanced food safety system, which may also mean costly products for civil society. It will be interesting to find out if consumers are willing to pay more for manufactured food with a certain degree of safety guaranteed.

9.4 Closing Statement

An enhanced access to the global food manufacturing value chain (GFMVC) has significant opportunities for both developing and developed countries alike. There is significant gain to be realised economically, in terms of access to international markets, and politically, in terms of increased confidence of civil society in the governance of the domestic market. Because of the elements of consumer health and safety that underlies the practice of accessing the GFMVC, countries and their food manufacturing enterprises need to develop their capability to comply with the basic requirements for food safety to set the scene for competitive repositioning. Important lessons and insights have been gathered from this study. It is hoped that other countries can also draw on lessons from this study to enhance their prospects of access.

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Appendices

APPENDIX A: Self-assessment Questionnaire

ISO 22000 Self-assessment Questionnaire

Instructions for Answering the Questionnaire

What follows is a series of questions covering the various aspects of food safety management in your organization.
Each of the questions is answered by selecting 1 of four options; where options (1) and (4), represent two extreme positions. Options (2) and (3) should be ticked if your organization occupies the 'middle ground', nearer to (1) or to (4). Tick one number for each question.

1. Management commitment

Does your organization recognize food safety management as an integral part of business performance by allocating responsibility at the most senior level for ensuring continual improvement in food safety performance?

◯ 1. There is no clear management responsibility

◯ 2.

◯ 3.

◯ 4. We have defined and documented responsibility and authority for food safety management Ultimate.

2. Food safety team leader

Does your organization have a food safety team leader?

◯ 1. We have not appointed a food safety team leader.

◯ 2.

◯ 3.

◯ 4. We have appointed a food safety team leader who meets the requirements of ISO 22000 and ensured that their training needs have been fully met. A food safety team has also been appointed.

3. Food safety team

Does your organization have a food safety team?

◯ 1. We have not appointed a food safety team.

◯ 2.

◯ 3.

◯ 4. We have appointed a food safety team that meets the requirements of ISO 22000 and ensured that their training needs have been fully met to reflect the food safety operations that exist within the organization.

ISO 22000 Self-assessment Questionnaire

4. Identification and definition of processes

Has your organization identified all its processes, mapped and defined them?

◯ 1. We have not identified all the processes or mapped and defined them.

◯ 2.

◯ 3.

◯ 4. We have identified all the processes from start to finish. These have been mapped and all the inputs and outputs defined.

5. Food safety policy

Does your organization define and document its food safety policy?

◯ 1. We do not have a food safety policy.

◯ 2.

◯ 3.

◯ 4. We have a comprehensive and documented policy that clearly defines the organization's commitment to food safety. It is communicated to employees and other relevant, interested parties. It expresses a clear commitment by top management to continual improvement of food safety performance and meets the requirements of 5.2 of ISO 22000.

6. Resources

Does your organization provide adequate resources for food safety management?

◯ 1. We do not allocate any resources.

◯ 2.

◯ 3.

◯ 4. We allocate resources and make budget provisions to ensure continual improvement in food safety performance.

ISO 22000 Self-assessment Questionnaire

7. Product specifications

Does your organization have a specification for each of its products?

- ◯ 1. We do not have specification for any of our products.
- ◯ 2.
- ◯ 3.
- ◯ 4. We have full specification for all of our products and variants and review them regularly.

8. Pre-requisite Programmes (RRPs)

Does your organization have operational PRP's?

- ◯ 1. We do not have any operational PRPs.
- ◯ 2.
- ◯ 3.
- ◯ 4. We have fully implemented operational PRPs that are routinely monitored and audited at regular intervals.

9. Hazard analysis

Has the organization carried out comprehensive hazard analysis?

- ◯ 1. We have not carried out any hazard analysis programme.
- ◯ 2.
- ◯ 3.
- ◯ 4. Our hazard analysis programme is comprehensive and covers all activities in the food manufacturing operations.

10. Risk assessment

Does your organization carry out food safety risk assessments?

- ◯ 1. We do not carry out food safety risk assessments.
- ◯ 2.
- ◯ 3.
- ◯ 4. Our food safety managment system includes a thorough risk assessment programme covering all activities and processes undertaken by the organization.

ISO 22000 Self-assessment Questionnaire

11. Legal and other requirements

Does your organization identify all legal and other requirements that apply to it?

◯ 1. We have little knowledge about legislation that might apply to our activities.

◯ 2.

◯ 3.

◯ 4. We operate procedures and implement controls to ensure regulatory compliance and meet the customer requirements and all voluntary programmes, etc. that the organization subscribes to.

12. Best practice

Does your organization identify and embrace any codes of practice and/or other guidance relevant to its activities?

◯ 1. We have no knowledge about codes of practice or other guidance that may be relevant to our activities.

◯ 2.

◯ 3.

◯ 4. We have embraced within our procedures what we consider to be the best practice on the basis of relevant industry guidance.

13. Objectives

Does your organization set objectives to ensure continual improvement of food safety performance?

◯ 1. We never set objectives.

◯ 2.

◯ 3.

◯ 4. We set and publish objectives consistent with our policy to ensure continual improvement of food safety performance, and these are regularly reviewed.

ISO 22000 Self-assessment Questionnaire

14. Employee responsibility

Does the organization assign food safety responsibility to its employees?

◯ 1. We do not assign any food safety responsibility to our employees.

◯ 2.

◯ 3.

◯ 4. Every employee is aware of their responsibility for the food safety of those they manage, themselves, others with whom they work and anyone else who visits the site.

15. Training

Does your organization carry out training to increase the awareness and knowledge of employees about food safety issues?

◯ 1. We do not carry out any food safety training.

◯ 2.

◯ 3.

◯ 4. We have a continual staff training programme to ensure employees are aware of current food safety issues and legal requirements. Staff are competent for the tasks they have to undertake and understand their individual responsibilities.

16. Internal communications

Does your organization provide information about food safety matters to employees?

◯ 1. We do not provide employees with information on any food safety issue.

◯ 2.

◯ 3.

◯ 4. We have an established communication system to keep employees informed about food safety issues, including policy, objectives, performance, remedial actions and future plans.

ISO 22000 Self-assessment Questionnaire

17. External communications

Does your organization provide information about food safety matters to relevant interested parties, i.e. customers, etc.?

◯ 1. We do not disclose information.

◯ 2.

◯ 3.

◯ 4. We have established procedures to inform all relevant interested parties about the organization's food safety related matters.

18. Traceability

Does your organization have a comprehensive documented system for traceability of its products?

◯ 1. We don't know what happens to our stuff after we've loaded it on the lorry, and don't care!

◯ 2.

◯ 3.

◯ 4. We have a comprehensive traceability system that embraces incoming supplies, food preparation processes and the output of products.

19. Documentation

Does your organization have a documented system for gathering and communicating relevant food safety information?

◯ 1. We do not have a system.

◯ 2.

◯ 3.

◯ 4. We maintain a comprehensive system, appropriate to the organization, including a food safety management manual and supporting records.

ISO 22000 Self-assessment Questionnaire

20. Operational control measures and critical control points (CCPs)

Does your organization embrace food safety issues in its operational control system?

- ◯ 1. We focus exclusively on 'business' issues, e.g. products or processes, and have no CCPs identified.
- ◯ 2.
- ◯ 3.
- ◯ 4. We have operational control measures in place for all identified hazards with CCPs determined and fully implemented.

21. Emergency preparedness and response

Does your organization have a procedure(s) for responding to emergency situations that might endanger food safety?

- ◯ 1. We do not have any procedures for responding to emergency situations.
- ◯ 2.
- ◯ 3.
- ◯ 4. We have an emergency response plan that is tested to adequately respond to food safety incidents and communicate them accordingly. Employees are aware of their role and responsibilities in implementing the plan.

22. Internal audits

Does your organization carry out food safety audits?

- ◯ 1. We do not carry out audits.
- ◯ 2.
- ◯ 3.
- ◯ 4. We have a programme of regular audits undertaken by at least one auditor who is both competent and independent. Remedial action is initiated where deficiencies are found.

ISO 22000 Self-assessment Questionnaire

23. Management review

Does your organization carry out management reviews of its food safety activities?

- ◯ 1. We do not carry out management reviews of food safety activities.
- ◯ 2.
- ◯ 3.
- ◯ 4. We undertake comprehensive regular reviews using a designated senior manager to ensure the efficiency and effectiveness of our food safety managment system (FSMS).

24. What is the size of your organisation in terms of number of employees?

25. Is your organisation certified to any of these standards?

- ☐ Ghana Standard Board Standard
- ☐ British Retail Consortium standard (BRC)
- ☐ ISO 22000
- ☐ International Food Standard (IFS)

Other (please specify)

APPENDIX B: Invitation Letter Used for Self-assessment Survey

School of Applied Sciences

Cranfield University
Cranfield
Bedfordshire MK43 0AL
England
Fax +44 (0) 1234 752159
Tel +44 (0) 1234 750111

05 July 2011

To whom it may concern,

Miss Lena Dzifa Mensah

I am writing to ask if you would be prepared to assist one of my doctoral students in the Department of Manufacturing. Lena is researching into the topic, *compliance with international food safety requirements'* in a developing nation context. This study seeks to develop a roadmap that will enhance compliance of the Ghanaian Food Manufacturing sub-sector with international food safety requirements.

The research focuses on both the UK Food and Drinks sector and the Ghanaian Food Manufacturing sub-sector. The rationale for including the UK in this study is to understand the process of compliance with international food safety requirements from the perspective of a country that has seen significant improvements in food safety, to draw on lessons to inform the development of an intervention for Ghana. As part of this research, Lena would like to include an assessment of food manufacturing enterprises in Ghana, to help determine the current state of enterprises in Ghana.

Your organisation is one of the cases that Lena would like to study, after careful consideration of a number of other companies, because you manufacture one of the products understudy in this project.
I would therefore be grateful if you would assist her by filling in the attached questionnaire.

The results of the questionnaire will remain anonymous.

Thank you for any assistance you are able to offer.

Yours faithfully,

Dr Denyse Julien

Senior Lecturer - Manufacturing Department

d.m.julien@cranfield.ac.uk

APPENDIX C: Overview of Results of Self-assessment Survey

Item no.	Name of enterprise	Perf. Rat.	PR - non-compl.	PR -Comp. @ 1st stage	SME	Non-complying after 2nd stage	Large	Local	International	Public-Private	Local Certifications	Inter. Certifications
1		51	51		Small			Local			GSB	
2		54	54		Micro			local			GSB	
3		58	58		micro			local			GSB	
4		61	61		Small			local				
5		62	62		Medium							
6		46	46		Micro			local			FDB/GSB	
7		51	51		Micro			local			GSB	
8		56	56		Micro			Local			GSB	
9		50	50		Large			Local			GSB	
10		47	47		Medium							
11		49	49		Medium			local		P-P	GSB	
12		41	41		Small			local			GSB	
13		74		74	Medium	Non-compliant					GSB	
14		74		74		Non-compliant					GSB	
15		87		87	Medium		Medium		International		GSB	ISO 22000
16		86		86	Small	Non-compliant			International	P-P	GSB	ISO9001
17		91		91	Small		Small				GSB	BRC/IFS
18		91		91	Medium		Medium		Internaitonal		GSB	
19		76		76	Large		Large		Interntional		GSB	
20		92		92	Large		Large		Internatioanal		GSB	BRC/IFS
21		92		92	Large		Large		Internatioanal		GSB	ISO 22000
22		84		84	Medium	Non-compliant			Internatioanal		GSB	ISO 9001/2000
23		88		88	Large		Large		Internatioanal		GSB	BRC/IFS/ISO 9000 /ISO 22000
24		74		74	Small	Non-compliant		Local			GSB	Working on HACCP
25		92		92	Large		Large		International		GSB	BRC/ISO 22000
26		92		92	Medum		Large		International		GSB	BRC/IFS
27		92		92	Large		Large	Local			FSB/GSB	BRC/IFS
28		84		84	Large		Large	Local			FSB/GSB	
29		81		81	Large	Non-compliant		Local			GSB	
30		89		89	Large	Non-compliant			International		GSB	
31		84		84	Medium	Non-compliant			International		GSB	
32		90		90	Micro		Micro	Local			GSB	
33		79		79	Medium	Non-compliant			International		GSB	
34		88		88	Medium		Medium	Local		P-P	GSB	IFS, BRC
35		88		88	Large		Large		International		GSB	HACCP
	Average	**73.71**	**52.17**	**85.45**	**34**	**9**	**14**	**16**	**14**		**32**	**13**
	Standard deviation	**17.25**	**6.28**	**6.33**				**5 did not indicate ownership type**			**3-no standard**	

APPENDIX D: Survey Questionnaire for the UK

An exploration of food safety management system (FSMS)

This survey draws on market leaders in the implementation and continuous improvement of food safety management systems (FSMSs) to explore 'best practices' associated with food safety management.

Please be assured that responses are confidential and anonymous, and no individual data will be shared.

A food safety management system (FSMS) is an integrated approach to risk management that includes a hazard analysis and critical control point (HACCP) system, pre-requisite programmes, and validation and verification procedures. These elements help to proactively deal with food hazards, and to reactively deal with contaminated products.

A. Background Information

1. Is your organisation certified to any of the following standards? (select all that apply)

- ☐ IFS
- ☐ BRC
- ☐ ISO 22000
- ☐ ISO 9000 series
- ☐ Others e.g. own food safety management system (FSMS) (please specify)

2. What is/are your organisation's motivation(s) for complying with the elements of the standards? (Please tick top five)

- ☐ Regulatory requirement
- ☐ Avoid potential export barriers
- ☐ Productsafety improvements
- ☐ Prospect of operational cost reductions
- ☐ Prevent liability claims
- ☐ Insurance requirement
- ☐ Enhance marketing advantage
- ☐ Improve corporate image
- ☐ Customer requirement
- ☐ Competitors accredited

3. What is/are your organisations benefit(s) for complying with the requirements of the standards? (Please tick top five)

- ☐ Compliance with regulatory requirements
- ☐ Improved corporate image
- ☐ Enhanced prospect of trading in other countries
- ☐ Lower insurance charges
- ☐ Reduced operating cost
- ☐ Improved employee morale
- ☐ Improved internal procedures
- ☐ Increased customer satisfaction
- ☐ Improved product safety
- ☐ No benefit

4. Rate factors in relation to contribution to success of food safety management system design, implementation and continuous improvement in your organisation

	Not at all important	Not important	Moderately important	Important	Very Important
Education and training	◯	◯	◯	◯	◯
Top management commitment	◯	◯	◯	◯	◯
Use of standard operating procedures	◯	◯	◯	◯	◯
All employees awareness of the importance of food safe to the organisation	◯	◯	◯	◯	◯
Employee involvement	◯	◯	◯	◯	◯
Employee satisfaction measurement	◯	◯	◯	◯	◯
Employee reward and recognition systems	◯	◯	◯	◯	◯
Culture within the organisation	◯	◯	◯	◯	◯
Continual improvement	◯	◯	◯	◯	◯
Government intervention	◯	◯	◯	◯	◯
Supplier management	◯	◯	◯	◯	◯
External linkages with learning centers	◯	◯	◯	◯	◯

5. Which of the following challenges were encountered by your organisation during implementation and continuous improvement of the food safety management system? (Please tick top five)

- [ ] Lack of technical knowledge and skill of employees
- [ ] Lack of access to adequate information
- [ ] Inappropriate infrastructural capabilities for validating, verifying the food safety system
- [ ] Employee resistance to change
- [ ] Blame culture of the organisation
- [ ] High cost of development and implementation
- [ ] Lack of government support (e.g. infrustructure,investments)
- [ ] Lack of technical knowledge and skill of employees
- [ ] High cost of education and training
- [ ] Rapid changes in regulation
- [ ] Lack of awareness of requirements

6. What is the one most important thing your organisation is doing to tackle your topmost challenge? (Please type)

B. Food Safety Managment System Design and Implementation

I. Management Responsiblity

7. Tick as appropriate

- [ ] Our food safety management system was developed by a consultant
- [ ] Our food safety management system was developed in house
- [ ] Our food safety management system was jointly developed by a consultant and our organisation

8. Which of the following represents how your organisation communicates food safety policy requirements to employees? (Select all that apply)

- [ ] Organising periodic in-house training programmes for employees
- [ ] Sending employees on periodic external training programmes
- [ ] Incorporating policy requirements into standard operating procedures
- [ ] Using visual aids (e.g. posters, and action plans in employee working areas)
- [ ] Involving employees in the development of the food safety management system
- [ ] Incorporating policy requirements into job descriptions

Other (please specify)

9. Which of the following practices are employed to manage supplier compliance with food safety requirements ? (Select all that apply)

- [ ] Education and training of suppliers
- [ ] Contractual agreements
- [ ] Third party certification
- [ ] Supplier auditing (Second party certification)
- [ ] Allow suppliers to self-assess raw materials and provide a declaration (first party certification)
- [ ] Checking raw materials on arrival

Other (please specify)

10. Which of these review practices relates to your organisation? (Select all that apply)

	Less frequently	Once a year	Twice a year	Three times a year	More frequently
Review HACCP system	○	○	○	○	○
Review pre-requisite programmes	○	○	○	○	○
Review validation and verification procedures	○	○	○	○	○
Review employee training needs	○	○	○	○	○
Review emergency preparedness	○	○	○	○	○
Review food safety management system	○	○	○	○	○

II. Resource Management

11. How does your organisation equip personnel with the knowledge and skills required to design and implement a food safety management system? (Select all that apply)

- [ ] In-house training
- [ ] On the job training
- [ ] Through external training centers
- [ ] By hiring
- [ ] Mentoring

Other (please specify)

12. Which of the following are employees trained in? (Select all that apply)

	Operations and production managers	Quality managers	Supervisors/team leaders	Other quality staff	Shop floor staff
Good manufacturing practices	☐	☐	☐	☐	☐
Personal hygiene practices	☐	☐	☐	☐	☐
HACCP principles	☐	☐	☐	☐	☐
Basic documentation procedures	☐	☐	☐	☐	☐
Nonconformance mana procedures	☐	☐	☐	☐	☐
Factory facilities managment (e.g. layout)	☐	☐	☐	☐	☐

13. How does your organisation determine the learning needs of employees? (Select all that apply)

- [ ] Organisational analysis
- [ ] Job analysis/task analysis
- [ ] Ask employees to suggest their learning requirements
- [ ] Observing individual employees at work
- [ ] Performance appraisal

Other (please specify)

III. Planning and realisation of safe products

14. Our organisation ...(Select all that apply)

- [ ] Incorporates food safety requirements into the design of products
- [ ] Incorporates food safety requirements into manufacturing processes
- [ ] Sample tests along production lines
- [ ] Tests products for food safety at the end of the production line
- [ ] Incorporates food safety requirements into layout and equipment
- [ ] Measures key performance indicators regularly
- [ ] Uses process control techniques to monitor internal processes
- [ ] Uses process audit techniques to assess internal processes
- [ ] Uses self-assessment schemes to verify and validate FSMS
- [ ] Uses second party auditors to verify and validate FSMS
- [ ] Uses third party auditors to verify and validate FSMS

Other (please specify)

15. Which key performance indicators are used by your organisation to monitor and track performance of your food safety management system? (Select all that apply)

- [ ] Reject rates on production line related to food safety issues
- [ ] Goods returned as a result of food safety issues
- [ ] Customer satisfaction
- [ ] Customer complains related to food safety
- [ ] Non-conformance detection rate
- [ ] Response time to out of control processes
- [ ] Increased sales
- [ ] Internal failure costs related to food safety
- [ ] Downtime related to food safety

Other (please specify)

16. Which of the following ownership structures represent your organisation? (Select the option that applies)

- ◯ Individually owned
- ◯ Cooperative
- ◯ Publicly owned (state owned)
- ◯ Public-private partnership
- ◯ Subsidiary of a multinational company
- ◯ Corporation

17. Which of the following alliances does your organisation have?

- [ ] Alliances with Universities
- [ ] Alliances with other food manufacturing enterprises
- [ ] Alliances with research bodies
- [ ] Alliances with sector bodies (e.g. Food Safety Association, Food and Drinks Federation,Improve)

Other (please specify)

18. What kinds of support does your organisation derive from sector bodies and associations?

- ☐ Technical guidelines on developing, implementing and maintaining food safety management systems
- ☐ Education and Training related to food safety
- ☐ Sector trends and other information related to food safety
- ☐ Financial support to implement and maintain food safey system
- ☐ No support

19. How many employees work at your factory?

- ◯ Less than 10 employees
- ◯ Greater than 10 but less than 50 employees
- ◯ Greater than 50 but less than 250 employees
- ◯ Greater than or equal to 250

20. If you would like the researchers to contact you for further information if need be, please fill in your details.

Company:	
Job Title	
City/Town:	
Email Address:	

APPENDIX E: Chi-square and Phi Analysis

Case Processing Summary						
	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Size of enterprises * Driver Items	112	100.0%	0	.0%	112	100.0%
Size of enterprises * Benefit Items	112	100.0%	0	.0%	112	100.0%
Size of enterprises *Challenge Items	112	100.0%	0	.0%	112	100.0%

Size of enterprises * Driver Items			
	Chi-square value	Asymptotic significance	Phi
Driver Items			
Regulatory requirement	0.101	0.75	-0.30
Avoid potential export barriers	0.001	0.976	-0.03
Product safety improvements	0.062	0.804	0.023
Prospect of operational cost reduction	0.081	0.409	0.078
Prevent liability claims	0.951	0.329	0.092
Insurance requirement	0.524	0.469	0.068
Enhanced marketing advantage	1.618	0.203	-0.12
Improved corporate image	0.279	0.593	0.05
Customer requirement	0.692	0.405	-0.08
Competitors accredited	0.835	0.361	0.086

Size of enterprises * Benefits			
	Chi-square value	Asymptotic significance	Phi
Benefit Items			
No benefit	0.874	0.35	0.09
Improved product safety	6.837	0.009	-0.24
Increased customer satisfaction	1.194	0.279	-0.11
Improved internal procedures	0.222	0.637	-0.45
Reduced operating cost	0.000	0.984	-0
Lower insurance charges	3.084	0.075	0.166
Enhanced prospect of trading in other countries	0.402	0.526	-0.6
Improved corporate image	0.038	0.845	0.018
Improved employee morale	0.401	0.527	0.06
Compliance with regulatory requirements	0.681	0.409	-0.08

Size of enterprises * Challenges			
	Chi-square value	Asymptotic significance	Phi
Challenge Items			
Lack of technical knowledge and skills of employees	0.087	0.768	-0.03
Lack of access to adequate information	0.583	0.445	-0.07
Inappropriate infrastructural capability for verifying and validating FSMS	2.58	0.108	-0.15
Employee resistance to change	0.008	0.929	0.008
Blame culture	1.445	0.229	-0.11
High cost of development and implementation	1.492	0.222	-0.12
Lack of government support	0.054	0.817	-0.02
High cost of education and training	0.0304	0.581	-0.05
Rapid changes in regulation	20398	0.122	0.146
Lack of awareness of requirements	0.785	0.376	0.084

APPENDIX F: Summary of Descriptive Analysis of Survey Responses

Breakdown of survey	
Total No. of surveys sent by post	500
Total returns	37
Total sample	463
Responses received	120
Response rate in %	25.9
Response rate after deleting missing data in %	24

Question 1				
Food safety management system in use	Total no. of responses	% of responses	FSMS in use	Total resp.
BRC	98	88	BRC Only	92
Own food safety management systems	27	24	Own FSMS only	10
ISO 22000	6	5	ISO 22000	4
IFS	3	3	Only IFS	1
Have no food safety management system but ISO 9000	1	1	Only ISO 9000	1

Question 2		
Motivation for compliance	Total no. of responses	% of responses
Product safety improvements	92	82
Customer requirement	89	79
Regulatory requirement	68	61
Enhance marketing advantage	67	60
Improve corporate image	62	55
Competitors accredited	45	40
Prevent liability claims	38	34
Prospect of operational cost reductions	35	31
Avoid potential export barriers	19	17
Insurance requirement	19	17

Question 3		
Benefits	Total no. of responses	% of responses
Increased customer satisfaction	97	87
Improved internal procedures	95	85
Improved product safety	92	82
Compliance with regulatory requirements	82	73
Improved corporate image	70	63
Improved employee morale	29	26
Enhanced prospect of trading in other countries	25	22
Reduced operating cost	15	13
Lower insurance charges	10	9
No benefit	1	1

Question 5		
Challenges	Total no. of responses	% of responses
Lack of technical knowledge and skill of employees	66	59
Employee resistance to change	66	59
Lack of awareness of requirements	45	40
High cost of development and implementation	41	37
Inappropriate infrastructural capabilities for validating, verifying FSMS	35	31
Blame culture	28	25
High cost of education and training	28	25
Rapid changes in regulation	23	21
Lack of access to adequate information	18	16
Lack of government support	16	14

Question 7		
Developer of the FSMS	Total no. of responses	% of responses
Consultant	2	2
In-house	87	78
Jointly developed by consultant and enterprise	23	21
Total	112	100

Question 8		
Mode of communicating FSMS policy requirements to employees	Total no. of responses	% of responses
Incorporating policy requirements into standard operating procedures	95	85
Organising periodic in-house awareness programmes for employees	90	80
Involving employees in the development of the FSMS	85	76
Using visual (e.g. action plans in employee work areas)	80	71
Incorporating policy requirements into job descriptions	69	62
Sending employees on periodic external food safety awareness programmes	68	61

Question 9		
Mode of managing supplier compliance to FS requirements	Total no. of responses	% of responses
Third party certification	94	84
Supplier auditing (second party certification)	94	84
Contractual agreements	86	77
Checking raw materials on arrival	86	77
Self-assessment (first party certification)	66	59
Educating and training suppliers	23	21

Question 10					
Review practices	Less frequently	Once a year	Two times a year	Three times a year	More frequently
	% of responses	% of responses	% of responses	% of responses	% of responses
Review HACCP system	0	54	15	4	14
Review prerequisite programmes	0	55	16	3	12
Review validation verification procedures	0	51	21	4	11
Review employee training needs	3	48	11	5	20
Review emergency preparedness	6	47	29	3	1
Review food safety management system	0	49	15	4	18

Question 11		
Mode of equipping personnel with competences for food safety	Total no. of responses	% of responses
In-house training	99	88
On the job training	91	81
Through external training centres	84	75
By hiring	21	19
Mentoring	59	53

Question 12					
Who is trained?	Operations and production management	Quality managers	Supervisors/team leaders	Other quality staff	Shop floor staff
	% of responses	% of responses	% of responses	% of responses	% of responses
Good manufacturing practices	96	93	93	84	88
Personal hygiene practices	98	98	99	95	98
HAACP principles	95	100	96	82	95
Basic documentation procedures	82	93	86	88	71
Non-conformance management procedures	79	66	65	48	50
Factory facilities management	93	81	62	37	29

Question 13		
Determining learning needs of employees	Total no. of responses	% of responses
Performance appraisal	89	79
Job analysis/task analysis	77	69
Observing individual employees at work	64	57
Employees suggesting their learning requirements	48	43
Organisational analysis	43	38

Question 14		
Planning and realisation of safe products	Total no. of responses	% of responses
Incorporates food safety requirements into manufacturing processes	109	97
Incorporates food safety requirements into layout and equipment	102	91
Measure key performance indicators regularly	100	89
Use process audit techniques to assess internal processes	96	86
Incorporates food safety requirements into the design of products	93	83
Sample tests along production lines	93	83
Use process control techniques to monitor internal processes	91	81
Tests products for food safety at the end of the production line	90	80
Use third party auditors to verify and validate FSMS	89	79
Uses self-assessment schemes to verify and validate FSMS	76	68
Use second party auditors to validate FSMS	57	51

Question 15		
Performance indicators	Total no. of responses	% of responses
Customer complains related to Food safety	107	96
Goods returned as a result of food safety issues	82	73
Non-conformance detection rate	80	71
Customer satisfaction	78	70
Reject rates on production line related to food safety issues	76	68
Internal failure costs related to food safety	56	50
Downtime related to food safety	56	50
Increased sales	33	29
Response time to out of control processes	24	21

Question 16		
Ownership structure	Total no. of responses	% of responses
Individually owned	54	48
Cooperative	4	4
Publicly owned	1	1
Public-private partnership	8	7
Subsidiary of a multinational company	28	25
Corporation	17	15
Total	**112**	**100**

Question 17		
Linkages/Alliances	Total no. of responses	% of responses
Alliances with sector bodies	92	82
Alliances with research bodies	75	67
Alliances with other food manufacturing enterprises	50	45
Alliances with Universities	35	31

Question 18		
Support from industry associations and sector bodies	Total no. of responses	% of responses
Technical guidelines on developing, implementing and maintaining FSMS	91	81
Education and training related to food safety	78	70
Sector trends and other information related to food safety	63	56
No support	8	7
Financial support to implement and maintain food safety systems	6	5

Question 19		
Factory size	Total no. of responses	% of responses
>50<250	53	46
>250	52	46
>10 <50	7	7
<10	0	0
Total	112	100

APPENDIX G: Questionnaire for Regulators in the UK

Where the UK is:

1. What is the objective of government with respect to food safety in the UK?
2. What is your perception of the current state of food safety for processed or manufactured food in the UK?
3. What mechanisms have contributed to this current state? Are they effective? How is effectiveness measured?
4. What factors have influenced the effects of current mechanisms on food safety?
5. What prompted the use of the current mechanism for food safety assurance in the UK? How can such a mechanism be effectively designed and implemented (organisational arrangements, values and resources and tools)?
6. What has been the role of government with respect to capability development to assure safe food?
    - Industry coordination (who coordinates and how is coordination achieved?);
    - Funding (How much funding is provided by government, local authorities, and enterprises?);
    - Education and training for regulators, businesses;
    - The provision of food safety services – product and system certification, accreditation and research services.
7. What has been the role of the private sector (in particular the sector bodies) with respect to funding and capability development to assure safe food?
    - Industry coordination,
    - Funding,
    - Education and training'
    - The provision of food safety services – product and system certification, accreditation and research services.
8. What support has government provided to UK enterprises to facilitate their compliance with food safety requirements?
9. Are there alternative mechanisms for food safety assurance? And on what basis should those alternative approaches be used? How can they be effectively designed and implemented?

Where the UK has come from:

10. Before the Food Safety Act in 1990, how was food safety being controlled and managed in the UK?
11. How would you assess the viability of such approaches to assure food safety?
12. What was the response of chain participants (various stakeholders) to the approaches that were being employed?
13. What were the merits and demerits of this approach? Did those approaches adequately assure food safety?
14. What factors influenced the effectiveness of the mechanism in use before the Food Safety Act, 1990.

APPENDIX H: Questionnaire for Sector Institutions in the UK

1. What is your perception of the status of food safety of manufactured food in the UK?
2. What mechanisms are viable for food safety assurance? On what basis should such mechanisms be used? – Can market mechanisms –those relying on demand and supply to make markets efficient work for food safety?
    a. Should government be involved in food safety assurance? What should their role be? particularly in relation to food safety capability development, in terms of:
    b. Industry coordination,
    c. Funding,
    d. Education and training'
    e. Provision of support services –e.g. research, laboratory, certification, and accreditation.
3. Should the private sector be involved in food safety assurance? And what should their role be? Particularly looking at:
    a. Food safety regulation
    b. Industry coordination,
    c. Funding,
    d. Education and training,
    e. Provision of support services –e.g. research, laboratory, certification, and accreditation.

APPENDIX I: Questionnaire for Food Manufacturing Enterprises

1. General overview of enterprises:
    a. Products, markets, ownership structure, enterprise size, standard in use.
2. What has been the impact of global food safety regulations on the enterprise?
3. What has been the impact of UK government legislation on the enterprises? Has it impacted on food safety in any way?
4. What other mechanisms would enhance food safety? In other words, is there an alternative to both private sector and government regulation?
5. What are the mechanisms for getting access to information on both domestic and international food safety regulations?
6. How does your enterprise ensure food safety on the shop floor?
    a. Management of the manufacturing process in-house,
    b. Management of suppliers - screening criteria for shot listing and final selection.
    c. Management of customer management
7. What factors in the UK food manufacturing environment have either facilitated or inhibited the compliance of enterprises with food safety regulations?
    a. Are there adequate resources (technical, financial support, training subsidies, etc) to facilitate compliance?
    b. Is the frequency of monitoring and enforcement adequate?
    c. What role have external linkages (universities, laboratories, sub-sector associations, third party auditors, accreditors) and institutions played?
8. Do consumers have a role in ensuring safe food?
    a. What role do/can consumers play in ensuring safe food?

APPENDIX J: Interview Script for Food Manufacturing Enterprises in Ghana

1. General overview of enterprises:
    a. Products, markets, ownership structure, enterprise size, standard in use.
2. What is your perception of food safety in the Ghanaian food manufacturing sector? And why is this status prevailing?
3. What are the mechanisms for getting access to information on both domestic and international food safety regulations?
4. How does your enterprise management food safety (the part of interest is how suppliers are managed - screening criteria for shot listing and final selection)?
5. What factors in the Ghanaian food manufacturing environment have either facilitated or inhibited the compliance of enterprises with food safety regulations?
6. What will be the role/impact of a technical regulation (based on HACCP) on the current state of food safety assurance? How can it be effectively designed and implemented?
7. What other mechanisms would enhance food safety? In other words, is there an alternative to current mechanisms for food safety assurance in Ghana? How can it be effectively designed and implemented?
8. Do consumers have a role in ensuring safe food?
    a. What role do/can consumers play in ensuring safe food?

APPENDIX K: Interview Script for Regulators in Ghana

1. What is the objective (goals, visions) of government with respect to food safety in Ghana?
2. What is your perception of the current state of food safety for processed or manufactured food in Ghana? Are they meeting these goals and objectives of government?
3. What are the current relevant mechanisms/regulations that apply to food manufacturing in Ghana? Are they effect for consumer protection?
4. Who enforces those regulations (organisational arrangements)? How are they enforced (inspection, monitoring, surveillance etc) on the ground?
5. What principles and values guide food safety control in Ghana?
6. What has been the role of government with respect to capability development to assure safe food?
    - Industry coordination (who coordinates and how is coordination achieved?);
    - Funding (How much of the budget of the regulator is funded by government? And what are the other sources of funding for food control activities?);
    - Education and training for regulators, businesses;
    - The provision of food safety services – product and system certification, accreditation and research services.
7. What has been the role of the private sector (in particular the sector bodies) with respect to funding and capability development to assure safe food?
    - Industry coordination,
    - Funding,
    - Education and training'
    - The provision of food safety services – product and system certification, accreditation and research services.
8. Do foods manufactured by indigenous manufacturers have the potential of meeting the requirements of the international market?
    a. If no, why? What factors influence the compliance of enterprises?
9. What is the potential role of a technical regulation designed on the basis of HACCP for enhancing the compliance of enterprises with food safety requirements?
10. Are there alternative mechanisms for food safety assurance? And on what basis should those alternative approaches be used? How can they be effectively designed and implemented?
11. What is the role of consumers in food safety assurance?

APPENDIX L: Sample Case Study Notes for Ghana

Sample script from regulators

Q1: Governments Objectives/Goals/vision for food safety in Ghana

Q2: Perception of current state of food safety in Ghana. Does it meet these objectives?

Some Ghanaian products have the ability to access the international market. The major problem is normally with consistency in quantity. Even the packaging used is not very good. We do not have good packaging companies here. ***Some enterprises try to save on cost and hence use bad packaging***. Some food processors were using soap boxes etc, to package all kinds of food together. We need to be able to sustain the quality of our manufactured products. We need to sustain quality, labelling and packaging and supply the quantities that are required at the right times.

Enterprises complain that the processes they go through at the GSB are too bureaucratic and hence they prefer to go behind us. I agree, however their timing is most often wrong. They must factor in the time required for the GSB to conduct their checks and tests before export. Some manufacturers request for an export certificate when the product is at the port and ready to be shipped or air lifted. We just cannot issue a certificate without having checked the product.

Manufacturers also have problems with preservation, storage, appearance and handling. You see the product it appears nice but underneath it has been kept under the sun for a very long time that it begins to decay.

We often receive alerts from the EU because they have the Rapid Alert Systems for Foods and Feed.

Aflatoxin has been the main thing with melon seeds khebab powder, peanut butter and maize products. More alerts from a particular country means there is a problem with their system.

Raw materials are often contaminated so if you use it in your manufacturing process, the finished product gets contaminated and when it is tested at the port, it is found. Without the support of customers, the products get through easily.

Some exporters do not go through the GSB but are able to go through CEPS to the international markets. When that happens, it means that enterprises are not monitored properly and regulators are not enforcing the law properly.

Q3: Current mechanisms/regulations for food safety that apply to the food manufacturing sector

Regulation

The primary regulation being enforced by the Ghana Standards Board is the Standards Decree 1970, the Ghana Standards Certification Mark Rules (as amended), 1970 and the Ghana Standards General Labelling Rules. The GSB derives its mandate from this regulation. The mandate is to ensure the wholesomeness of food (Standard Decree, 1970). However, there are flaws with the implementation and enforcement of this law.

Some enterprises, particularly the SMEs are not complying because they are able to operate even though they have not registered with the Board or have product certification. According to enterprises, certification increases their cost. Some claim they will comply if there is a fair playing ground for all, so that no enterprises has the undue advantage of not having a certification but selling their product alright.

The fish and fishery products sector is properly documented in inverted comers; especially those exporting into the EU. To ensure that there are no double standards, Ghana has a fisheries product regulation that covers the control of exports of fish. And every body or enterprise who wants to export has to comply with that export regulation. It is based on all the EU regulations relevant to fish: 852,853,854. Every body that wants to export must comply with that regulation.

There are no specific laws for non-traditional processed foods for export. Therefore, we came up with a procedure food manufacturers have to follow, because we have the mandate from the Standards Decree to regulate food. The procedure required that enterprise registered with the GEPC first, so that they can receive guidelines on the particular product they want to export, however, enterprises were not complying. They by-pass these institutions and export. At the importing country's boarders, problems were found with the food products and alerts were issues frequently on Ghanaian products.

As a result, we decided to have a second look at it. Stakeholders were invited, and we developed a set-by-step procedure, in collaboration with the GEPC.

If any enterprises want to export, the have to:

1. Do a partial registration with the GEPC ,
2. Go to GSB so they inspect the premises for processing the food.
3. If successful, and compliant with requirements, a report is written, then the enterprise is approve or not approve,
4. Then you go to the GEPC for full registration.
5. From that point, every time you want to export, you go for an export certificate because each consignment is different. If there is the need to do sampling of the product, we sample it. It is also linked to the certification mark process.
6. If an enterprise is on that programme, and needs to do an emergency export, we do not have to issue an export certificate because we know who they are and do not have to do a test, but still have to look at the consignment before it is sent.

So it came into force in July, 2008. A list was sent from GEPC, to the CEPS commissioner, who should give a commissioners order to CEPS officers at the ports or airports (customs officers do the final checks before export). We were having problems because when the consignments get to the export points, customs officers allow products to go, sometimes without certificates. So we need the help of the Commissioner so that whether GSB officers are at the export points or not, consignments with certificates will be allowed to be exported and those without confiscated.

One of our biggest changes is that we do not have a place at the airport to inspect, so some consignments cannot be opened before export.

We are also going to write to the freight forwarders and airlines to help us deal with some of these problems.

We have a new standards bill and some of these will be reviewed. In most countries, it is the high risk products that are checked: the products with health and safety implications. Otherwise, manufacturers can just produce anything and put it on the market. This is what we are working towards.

Imports also go through sampling and checking at the ports. There are still some problems but …they come in, we look at it, take samples where necessary, and then we zone them. We know areas where the bad things are coming from. We know manufacturers who are bringing in the bad things and then the frequency of testing will altered).

Procedure:

1. Register with GSB,
2. Apply for certification of the product
3. GSB inspect, look at labels, inspect the facilities, samples are drawn for testing and at the end of the testing and inspection,
4. There is a certification market committee meeting and a decision is taken.

We also have an Li for labelling and we basically check for conformity with the requirements:

- the name of the product:
- A list of ingredients in the food,
- An indication of the minimum durability in the form of :
    1. Manufacture and expiry date or best before date, or use-by-date in respect of food,
- Any special storage conditions and handling precautions that may be necessary,
- Instructions for use in respect of food, if it would be difficult to make appropriate use of the food in the absence of such instruction,
- An indication of the net content in the form of net mass or volume;
- Code marks or numbers indicating the batches of production or packaging to which the food belongs,
- Country of origin,

- Name and address of the producer, manufacturer, importer, packer, distributor or of the seller of the food

What we observe is that some manufacturers print a yearly calendar on the label, and use ball pens to mark the manufacturing and expiry dates. Because of this they are retailers are able to alter dates to suit them. Secondly, the paper material used for labelling is of lower quality, as a result, excessively handling the product destroys the label and the labelling information is removed by the time the product reaches the end consumer. As a result of the above, there is little traceability in the system.

Q4: Who enforces those regulations (organisational arrangements)? How are they enforced (inspection, monitoring, surveillance etc) on the ground?

Enforcement /Monitoring

We are responsible for fish and fishery product exports. For fish, we have a list of establishment and exporters. For the others we have a list of manufacturers and exporters. So we occasionally visit the enterprise and inspect the premises and the products as well.

Legislations are changing. Before now, we were the only institution regulating food but now we have the Food and Drugs Board as well. At the moment, there is some sort of confusion between us as to who is doing what. But the law says that we should regulate food so we will continue but we are not forcing enterprises like we used to. Some of the shops require that manufacturers have our mark so they are using it as de facto mandatory regulation. We have a new standards bill and some of these things will be addressed. At the moment, this regulation has not been repealed so we say that people should come for the certificate before putting their products on the market.

What i see happening is that FDB will be controlling what is on the market. Enterprises that need to export and want the mark can come here and have the certification mark.

Some of our laboratories are accredited. I will get the list for you. UNIDO has been very instrumental in that.

We do not do system certification because we are not accredited to do so. However, we assist enterprises who apply to the Board to implement an integrated food safety management system get the right organisations to execute such projects for them. We also facilitate access to third party bodies by giving information on who to contact.

The Ghana Standards Board has outlets in some regions. Some of the workforce at these regional offices have the competence for inspection and others are just there for administrative purposes only. We do:

- Yearly renewal of product certificates
- Yearly visits to manufacturing sites for hygiene and other good manufacturing practice audits
- Market surveillance to ensure that products certified under the product certification schemes are still complying

Expectation on visits

- The only proof of due diligence on inspection and audits visits is the documentation provided,
- Proof is required of good manufacturing practices
- Good hygiene practices and standards
- Dedicated resources
- Plant layout
- Certificates and their validity
- EPA clearance or certificate for first time visits and manufacturers

Q5: What principles and values guide food safety control in Ghana?

Q6: What has been the role of government with respect to capability development to assure safe food?

Government has a significant role to play in ensuring that the status of food safety reaches set standards or goals and meets the basic requirements of the international market. In Ghana, each government has its goals and decides which ministry to empower. E.g. the recent past government gave a lot of power to the FDB to certify enterprises through the advocacy work of the Minister of Health.

As a result, there are conflicts of roles and responsibilities (because the Boards partially derive their revenue from product certification and engagement with enterprises).

We are a government agency. We enforce the laws enacted by government. We provide education, information and advice enterprises. However, the responsibility is on the food business operator to find out about the requirements of the market in which they want to operate in. That is why the national enquiry point has been set up. It is free.

We also provide conformity assessment services to industry. That is not free. Enterprises have to pay for it. The fees are subsidised for SMEs. Government currently funds the budgets of the Board, however, we are being encouraged to work towards self-financing. The funds internally generated from the provision of food safety services also supports our activities, however, we have to go through government to get access.

Since 2008, Ghana, through the GSB has started a capacity building programme to equip enterprises with the knowledge and competence for food safety. His is done through training programmes.

A pilot capacity building programme has been initiated (sponsored by UNIDO) to help some food manufacturing enterprises comply with the ISO 22000 international food safety standard, which ahs been adopted by Ghana. Initial invitation was made (Public adverts).

- 8 enterprises, who qualified, have been chosen.
- A consultant (SGS won the contract) was brought in to train individual auditors and increase awareness levels for enterprises.
- The project is still underway.

Q7: What has been the role of the private sector (in particular the sector bodies) with respect to funding and capability development to assure safe food?

Sector association have been instrumental in the dissemination of food safety information to enterprises. The problem is that most enterprises do not patronise their services. Some enterprises just join associations when they hear that government has provided funds to that association to support enterprises. They disappear when they receive those funds.

International bodies mainly undertake the provision of food safety services. They have capacity for both product certification and system certification. We do not currently have any institution in Ghana that undertakes accreditation.

Q9: What is the potential role of a technical regulation designed on the basis of HACCP for enhancing the compliance of enterprises with food safety requirements?

We are not ready for HACCP regulation, because we do not have the food safety capacity at the moment to implement it. Regulatory intervention would improve the current situation- this way; changes in government would have so great an impact in the enforcement activities of regulators. Role and responsibilities should be clearly defined and the regulatory agencies given the enough authority to enforce and monitor enterprises in the market place.

Q10: Are there alternative mechanisms for food safety assurance? And on what basis should those alternative approaches be used? How can they be effectively designed and implemented?

Education is the key. We need to collaborate more. We need the cooperation amongst CEPS, GEPC etc to have things work effectively. We also need improvement in enforcement of regulations currently n operation – more people are needed on the field. These on the ground officers need to be trained and provided with the adequate resources to execute their duties.

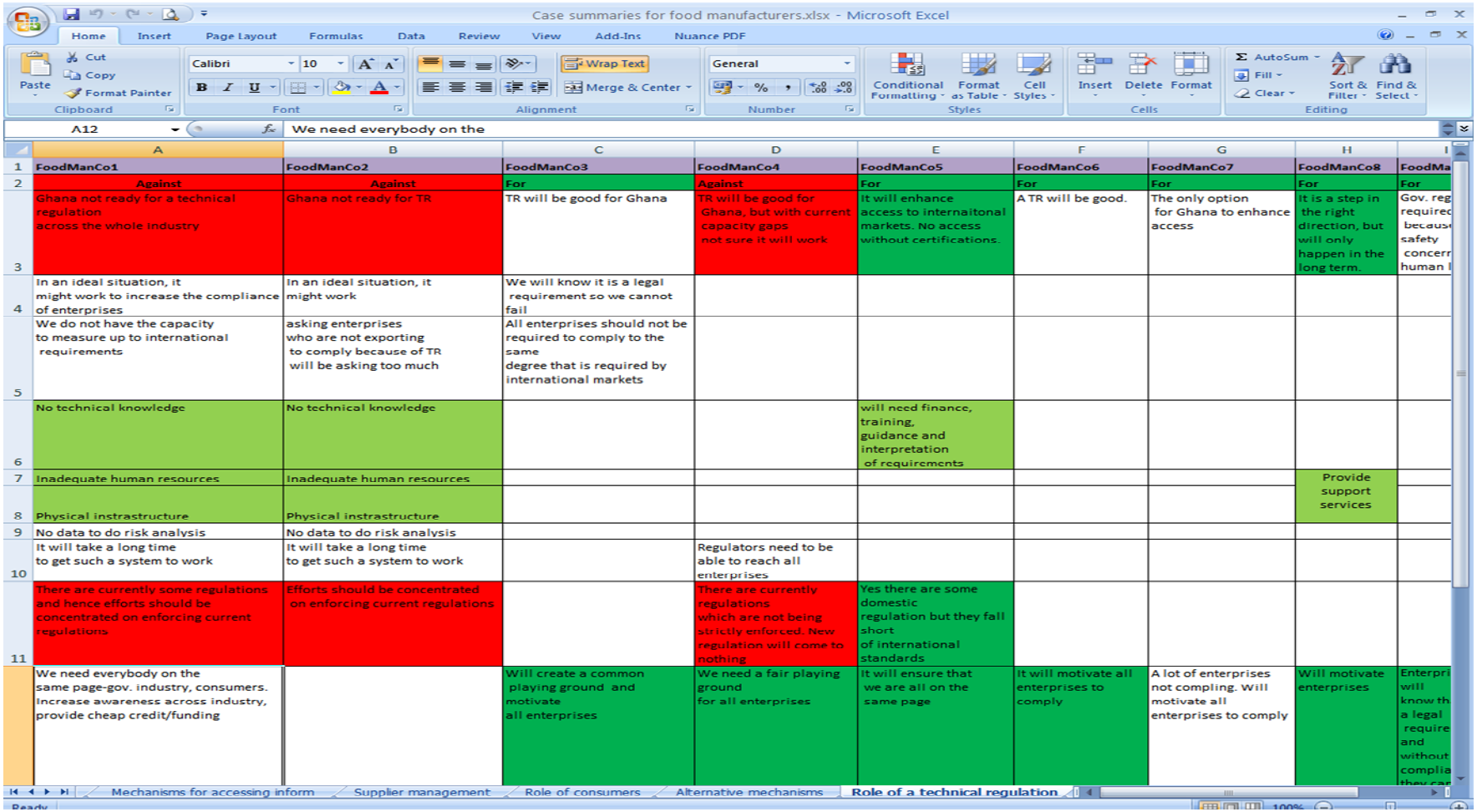
Sensitisation of both consumers and the manufacturers concerning the important role compliance with food safety requirements play in exports and economic activity in general is required.

Q11: What is the role of consumers in food safety assurance?

Consumers should check for expiry dates and the certification mark on products. They need to be educated more. They lack knowledge and awareness relevant to food safety, particularly, the less literate population. They do not check for the status of products and rush for bargains on products which are about a week or two weeks from their use by dates.

Consumers have minimal involvement in the regulatory process

APPENDIX M: Sample Excel Sheet for Ghana



Case summaries for food manufacturers.xlsx - Microsoft Excel

	A	B	C	D	E	F	G	H	I
1	FoodManCo1	FoodManCo2	FoodManCo3	FoodManCo4	FoodManCo5	FoodManCo6	FoodManCo7	FoodManCo8	FoodMa
2	Against	Against	For	Against	For	For	For	For	For
3	Ghana not ready for a technical regulation across the whole industry	Ghana not ready for TR	TR will be good for Ghana	TR will be good for Ghana, but with current capacity gaps not sure it will work	It will enhance access to internaitonal markets. No access without certifications.	A TR will be good.	The only option for Ghana to enhance access	It is a step in the right direction, but will only happen in the long term.	Gov. reg required becaus safety concer human h
4	In an ideal situation, it might work to increase the compliance of enterprises	In an ideal situation, it might work	We will know it is a legal requirement so we cannot fail						
5	We do not have the capacity to measure up to international requirements	asking enterprises who are not exporting to comply because of TR will be asking too much	All enterprises should not be required to comply to the same degree that is required by international markets						
6	No technical knowledge	No technical knowledge			will need finance, training, guidance and interpretation of requirements				
7	Inadequate human resources	Inadequate human resources						Provide support services	
8	Physical instrastructure	Physical instrastructure							
9	No data to do risk analysis	No data to do risk analysis							
10	It will take a long time to get such a system to work	It will take a long time to get such a system to work		Regulators need to be able to reach all enterprises					
11	There are currently some regulations and hence efforts should be concentrated on enforcing current regulations	Efforts should be concentrated on enforcing current regulations		There are currently regulations which are not being strictly enforced. New regulation will come to nothing	Yes there are some domestic regulation but they fall short of international standards				
	We need everybody on the same page-gov. industry, consumers. Increase awareness across industry, provide cheap credit/funding		Will create a common playing ground and motivate all enterprises	We need a fair playing ground for all enterprises	It will ensure that we are all on the same page	It will motivate all enterprises to comply	A lot of enterprises not compling. Will motivate all enterprises to comply	Will motivate enterprises	Enterpri will know th a legal require and without compli

Mechanisms for accessing inform | Supplier management | Role of consumers | Alternative mechanisms | Role of a technical regulation

APPENDIX N: AHP Analysis for Sub-criteria

Rapidly dynamic sector 0.0334	Priorities	
	Local	Global
Statutory regulation	0.3492	0.0117
Self-regulation	0.0935	0.0031
Co-regulation	0.1692	0.0056
Information and education	0.1776	0.0059
Incentives/market mechanisms	0.1593	0.0053
No intervention	0.0513	0.0017
CR	0.0064	

Imminent risk 0.0027	Priorities	
	Local	Global
Statutory regulation	0.4738	0.0013
Self-regulation	0.0500	0.0001
Co-regulation	0.1744	0.0005
Information and education	0.1177	0.0003
Incentives/market mechanisms	0.1492	0.0004
No intervention	0.0349	0.0001
CR	0.0288	

SMEs with limited resources 0.0195	Priorities	
	Local	Global
Statutory regulation	0.283378	0.005526
Self-regulation	0.077054	0.001503
Co-regulation	0.153872	0.003
Information and education	0.152505	0.002974
Incentives/market mechanisms	0.295867	0.005769
No intervention	0.037325	0.000728
CR	0.0144	

A culture of regulatory resistance 0.0394	Priorities	
	Local	Global
Statutory regulation	0.0760	0.0030
Self-regulation	0.3763	0.0148
Co-regulation	0.2141	0.0084
Information and education	0.1778	0.0070
Incentives/market mechanisms	0.1088	0.0043
No intervention	0.0470	0.0019
CR	0.032	

Persistent irrational actors 0.0043	Priorities	
	Local	Global
Statutory regulation	0.3905	0.0017
Self-regulation	0.0776	0.0003
Co-regulation	0.1996	0.0009
Information and education	0.1529	0.0007
Incentives/market mechanisms	0.1157	0.0005
No intervention	0.0637	0.0003
CR	0.024	

Lack of coherent industry leadership, representation, and capability 0.0576	Priorities	
	Local	Global
Statutory regulation	0.4246	0.0245
Self-regulation	0.0931	0.0054
Co-regulation	0.1971	0.0114
Information and education	0.0275	0.0016
Incentives/market mechanisms	0.1937	0.0112
No intervention	0.0640	0.0037
CR	0.0112	

Irreversible or acute health risk 0.1481	Priorities	
	Local	Global
Statutory regulation	0.4557	0.0675
Self-regulation	0.0509	0.0075
Co-regulation	0.2079	0.0308
Information and education	0.1459	0.0216
Incentives/market mechanisms	0.1072	0.0159
No intervention	0.0323	0.0048
CR	0.0592	

Large discrepancy between public interest and private costs 0.0058	Priorities	
	Local	Global
Statutory regulation	0.0831	0.0005
Self-regulation	0.0903	0.0005
Co-regulation	0.1156	0.0007
Information and education	0.2912	0.0017
Incentives/market mechanisms	0.3645	0.0021
No intervention	0.0554	0.0003
CR	0.0288	

Lack of capability of enterprises 0.0342	Priorities	
	Local	Global
Statutory regulation	0.0714	0.0024
Self-regulation	0.0909	0.0031
Co-regulation	0.0714	0.0024
Information and education	0.2169	0.0074
Incentives/market mechanisms	0.4902	0.0168
No intervention	0.0591	0.0020
CR	0.0112	

Young industry 0.1325	Priorities	
	Local	Global
Statutory regulation	0.2580	0.0342
Self-regulation	0.0972	0.0129
Co-regulation	0.1303	0.0173
Information and education	0.2163	0.0287
Incentives/market mechanisms	0.2575	0.0341
No intervention	0.0406	0.0054
CR	0.0384	

Persistent irrational actors 0.2408	Priorities	
	Local	Global
Statutory regulation	0.3905	0.0940
Self-regulation	0.0776	0.0187
Co-regulation	0.1996	0.0481
Information and education	0.1529	0.0368
Incentives/market mechanisms	0.1157	0.0279
No intervention	0.0637	0.0153
CR	0.024	

Global competition 0.1569	Priorities	
	Local	Global
Statutory regulation	0.3410	0.0535
Self-regulation	0.0673	0.0106
Co-regulation	0.1812	0.0284
Information and education	0.2416	0.0379
Incentives/market mechanisms	0.1334	0.0209
No intervention	0.0356	0.0056
CR	0.0272	